

Division 2: Mastigomycota

Sub division1: Haplomastigomycotina

This sub division classified to three classes depending on number, type and location of flagella

Class 1: Chytridiomycetes

General characteristics:-

- 1- Production motile cell –zoospores and planogametes - each with a single, posterior, whiplash flagellum.
- 2- Chytridiomycetes are more prevalent in aquatic habitats, many of them, however, also inhabit the soil, some of them are parasites.
- 3- Somatic structures are:
 - A- Coenocytes structure.
 - B- Multinucleate, globose or oval with or without rhizoid
 - C- Well- develops mycelium.

This class was classified into three orders:

Order 1: Chytridiales:

General characteristics:-

- 1- The organisms which included in this order are unicellular, globose, with or without rhizoid and holocarpic.
- 2- Water or soil inhabiting species, many of them former parasitic on algae and water mold, many of the later on vascular plants.
- 3- There are only a few economically important parasites in the entire order. *Synchytrium endobioticum* causes the disease known as Potato wart.-Black wart disease on Potato-.



Black wart of Potato

Life cycle of *Synchytrium endobioticum*:

The fungus causes hypertrophy and hyperplasia of the surface cell layers of the infected Potato tubers; which contain **resting sporangia**.*

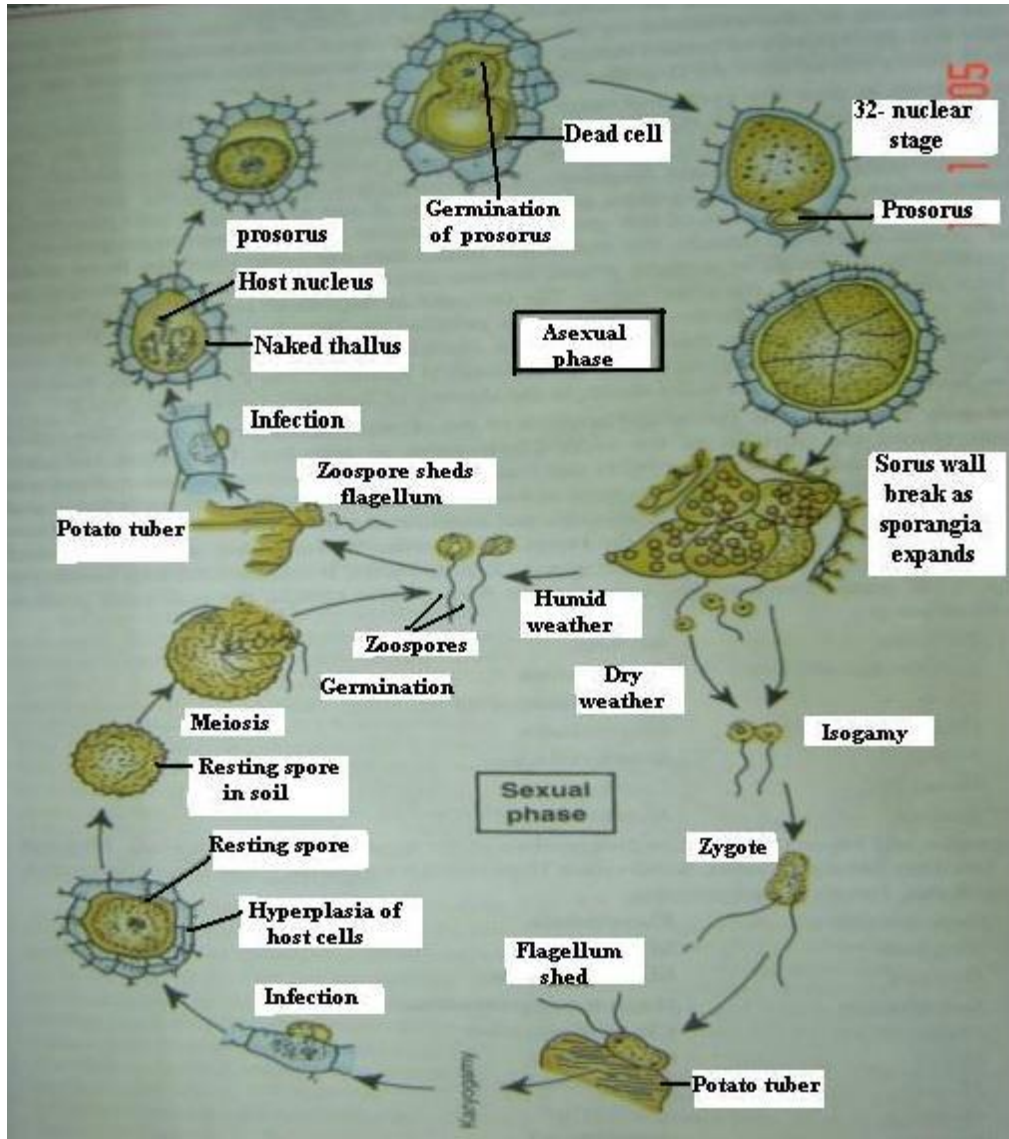
When the warts lyses, the resting sporangia are release in soil, and then the **zoospores** are released when the conditions are suitable*. The zoospores are penetrating into the host through the root hairs, then the zoospore increase in size and produce two layers chitinous wall around itself to form **prosorus**.* The fungus- parasite- increase in size, and mitosis is started to give 32 nuclei, then cytoplasmic septa are formed to form 4-9 sporangia in one sac –**Sorus**.* The mitosis is continuous to give 100-300 nuclei in each sac, each nuclei will be converting to zoospore in the presence of water. * The zoospore can be penetrating the host again.*

Asexual cycle

Sexual cycle will be started in :???

Lacking the water at a certain period in the development of the fungus affords a maturation of gametes.* These gametes are union in pairs to form zygote, which can penetrating the host cell.* The parasite will increase in size and converting to resting sporangium, then the nucleus is undergo division to give zoospores.

Note: It is considered that, meiosis is occurring during zoospore formation



Life cycle of *Synchytrium endobioticum*

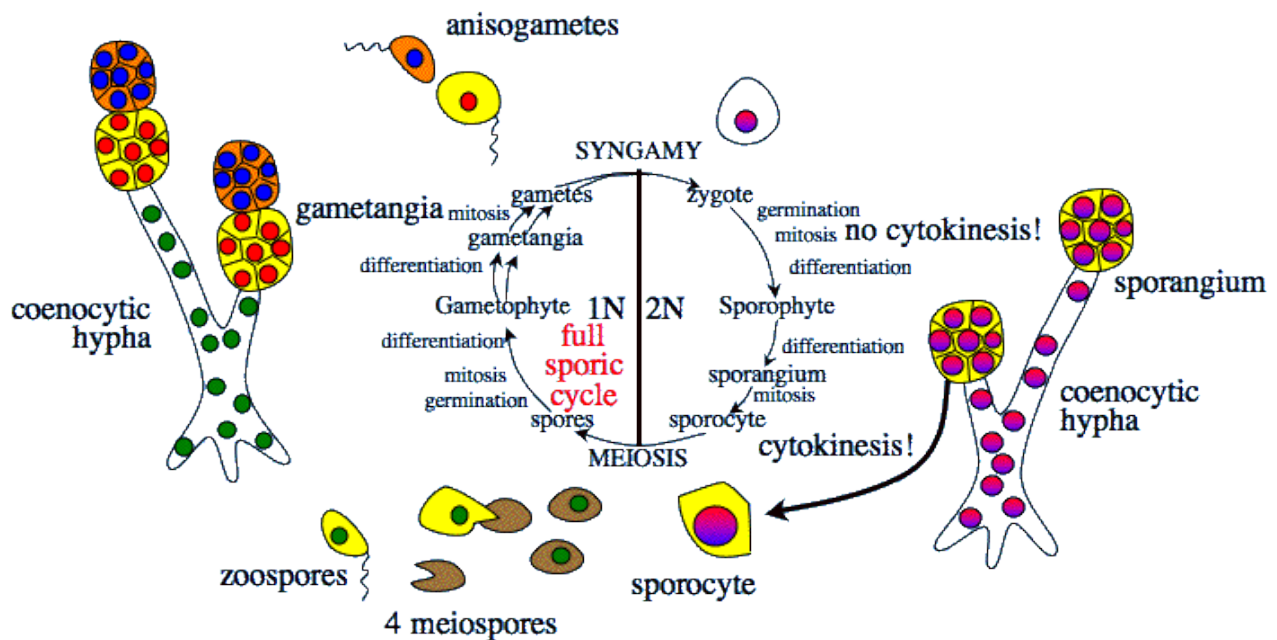
Order 2: Blastocladales**-General characteristics:**

- 1- Most of them are saprobes on animals and plants debris.
- 2- Vegetative structure is Eucarpic.
- 3- Somatic structure consists of basal cell with rhizoid and bearing one sporangium or more.

Family: Blastocladiaceae**Genus: *Allomyces*****Life cycle of *Allomyces*:-**

Species of the genus *Allomyces* exhibit a definite alternation of generations, haploid gametothallus alternating with diploid sporothallus. The gametothalli produce colorless female gametangia and orange male gametangia usually in a 1:1 ratio. The male gametangia are smaller than female and borne on the later such as in *A. macrogynus* or below them such as in *A. arbuscula*. Both types of gametangia release motile gametes, the gametes are posterior uniflagellate, copulation then occurs to give zygote. Zygote enlarges and gives rise to the first hyphal tube, which elongates, branched dichotomously, and develops into a diploid sporothallus. At maturity, the sporothalli form two types of sporangia; thin walled, elongated, colorless zoosporangia— Mitosporangia, and thick-walled, pitted, resistant sporangia— Meiosporangia -resting sporangia- that contain melanin pigments and appear reddish brown. The zoosporangia germinate soon after their formation, releasing diploid zoospores –mitospores- that swim about for a time, encysted and give rise to sporothalli, thus repeating the diploid generation. The resistant sporangia- Meiosporangia- require a rest of 2-8 weeks or more before they germinate. Meiosis in the resistant sporangia takes place at the time of germination to form haploid zoospores; that are slightly smaller than the diploid. Then meiospores being haploid give rise to gametothalli, which produce gametangia instead of sporangia .

Life Cycle of *Allomyces arbuscula*



Life cycle of *Allomyces arbuscula*

Order 3: Monoblepharidales

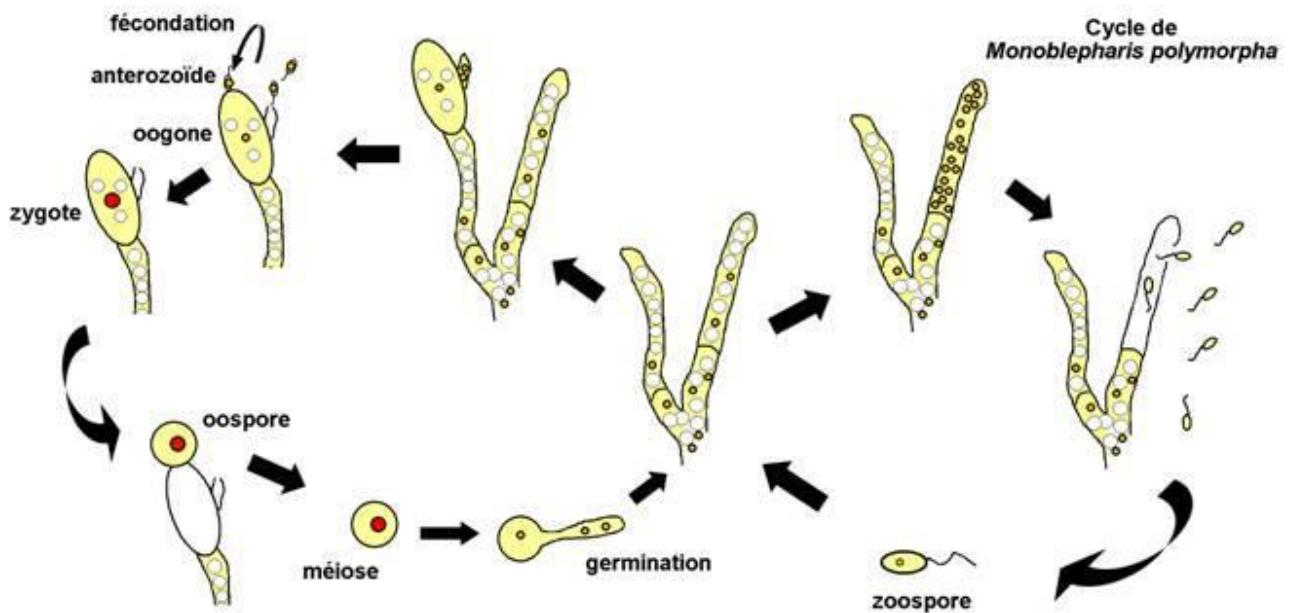
Family: Monoblepharidaceae

Genus: *Monoblepharis*

Life cycle of *Monoblepharis polymorpha*:

The somatic thallus consists of hyphae whose protoplasm which is highly vacuolated, appears foamy. Elongated sporangia are borne singly at the hyphal tips.* They are generally no larger in diameter than the somatic hypha. * The sporangia are subtended by a septum, multinucleate from the first, the sporangial protoplast becomes divided into many uninucleate portions, each of which develops into a posterior uniflagellate zoospore.* The zoospores are released from the tip of sporangium, swim for a time, become rounded, and germinate, each by a germ tube, forming a new mycelium –Asexual cycle-. *The same thallus that produces the sporangia produces gametangia –male and female-.*The male is the narrow elongated antheridia being borne on the

rounded, large oogonia.* A number of uniflagellate gametes, called antherozoids, are formed within and released from each antheridium.*The protoplast of the oogonium becomes rounded and forms uninucleate oospore.* After the antherozoids are released from antheridia, they swim or creep over the oogonia.* A single sperm enters the oogonium through a papilla present in the oogonial wall, penetrates the oosphere to give fertilized egg.* The fertilized egg soon emerges from the oogonium, and while still attached to the oogonial wall, secretes a thick wall around itself and develops into oospore.*Karyogamy is delayed until the oospore wall is partially formed, the oospore germinates under favorable conditions by producing a hypha that develops into new thallus.* Meiosis probably takes place during the germination of the oospore, when the zygote nucleus first divides.



Life cycle of *Monoblepharis polymorpha*