Department of biology

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((Mycology))

Stage (-3-)

LEC- ((6))

Simple Fungi

By

Msc.Baneen Maen Kareem

Simple Fungi

1- This group of fungi is more advanced than the false fungi.

2-They share many characteristics with the true fungi.

- Their fungal body consists of branched, interwoven filaments.
- A thick cell wall surrounds the hyphae.
- They obtain their nutrients through absorptive feeding.

3- They differ from true fungi because their hyphae are non-septate (lacking cross walls).

- They possess flagellated stages known as zoospores (swimming spores).

Kendrick (2002) reclassified these organisms as simple fungi and divided them into three phyla:

Oomycota

Hyphochytridiomycota

Labyrinthulomycota

Phylum Oomycota

Also called “biflagellate-zoospore fungi” (Biflagellate zoospores).

These organisms are characterised by the formation of a sexual spore called an oospore, asexual motile zoospores that possess two flagella: one simple whip-lash (rearward) flagellum, and another fibrous (tinsel-type) flagellum

Some Members may be **holocarpic** (entire thallus becomes reproductive) or **eucarpic** (only part becomes reproductive).

In the vegetative phase these organisms are diploid (2n) and meiosis occurs within specialised gametangia—unlike true fungi

Their hyphae are generally coenocytic (lacking septa). They differ from true fungi in several key features:

their hyphal walls often contain cellulose and β-glucans (not chitin),

their mitochondria have tubular cristae rather than flattened ones, and their method of food storage and respiration also diverges. These features match those described earlier for simple fungi

Reproduction in these organisms occurs via contact of specialised gametangial structures, producing motile zoospores that are pyriform (pear-shaped) or sometimes reniform (kidney-shaped).

These fungi occur in a variety of environments: freshwater and marine habitats, free-living soils acting as decomposers, or as parasites.

They have significant economic importance, as pathogens of humans, animals, plants, fish, and birds, while some play roles in nutrient cycling in nature. It is noteworthy that their oospores, under dry conditions, may germinate as if they were conidia—a developmental adaptation of evolutionary significance.

According to Alexopoulos (1979), these fungi are classified into five orders:

Order:- Saprolegniales
Order:- Peronosporales
Order:- Lagenidiales
Order:- Rhipidiales
Order:- Leptometales

Order 1:
Saprolegniales
Family: Saprolegniaceae Ex: *Saprolegnia parasitica*:
General characteristics:-
1. Some species such as *Saprolegnia parasitica* causes diseases of fish .
2. Mycelium is coenocytic, we can see septum only in the bases ofreproductive organs-sporangia or gametangia.
3.Asexual reproduction by biflagellated zoospores. There are two types ofzoospores:
A. Pyriform zoospores, they called also primary zoospores.
B. Reniform zoospores: they called also secondary zoospores.
Species that produce only one type of zoospore are monomorphic , whilethese which producing two types are dimorphic.
According to the swarming period, fungi in this order divided into:
1-Monoplanetic fungi: Those that have only one swarming period and onlyone type of zoospore ex: *Pythiopsis*.
Pyriform zoospore →Swarming→ encystment → germination →newthallus
2-Diplanetic fungi: Those that have two swarming period and two types ofzoospores ex: *Saprolegnia*.
Pyriform zoospore →Swarming→ encystment → reniformzoospore→Swarming→encystment → germination →new thallus
3-Polyplanetic fungi: Those that have more than two swarming

period, thezoospore which is repeated is secondary zoospore ex: *Dictyuchus*.
Pyriform zoospore →Swarming→ encystment
→ reniform
zoospore→ Swarming→ encystment → reniform zoospore→ Swarming→ encystment → germination → new thallus

4-Aplanetic fungi: Those that have no swarming period and so there is nomotile spores ex: *Geolegnia*.

Life cycle of *Saprolegnia parasitica*

- **Sporangium Formation:**

Elongated, tapering sporangia develop at the tips of somatic hyphae and are separated from them by a septum.

- **Asexual Cycle:**

The sporangium releases **primary biflagellate zoospores** that swim in water, encyst, and then germinate to produce **secondary zoospores**, which later germinate into a **new thallus**.

- **Successive Asexual Generations:**

New sporangia are formed internally through **internal proliferation**, resulting in several successive asexual generations.

- **Sexual Cycle:**

Under favorable conditions, **oogonia** and **antheridia** are produced. **Meiosis** occurs in these gametangia, forming haploid oospheres and haploid male nuclei.

- **Fertilization and Oospore Formation:**

A fertilization tube from the antheridium transfers a male nucleus into the oosphere, forming a **diploid zygote nucleus**. A thick wall develops around it to form an **oospore**, which, after a resting period, **germinates to produce a new thallus**, completing the life cycle.

Diplanetism:- The phenomenon, observed in some members of the Oomycetes, of there being two distinct motile phases, with morphologically different zoospores formed in each.

Order: Peronosporales

This order is highly important because its members are well-known **plant parasites**, and some species can also parasitize humans.

It includes three main families:

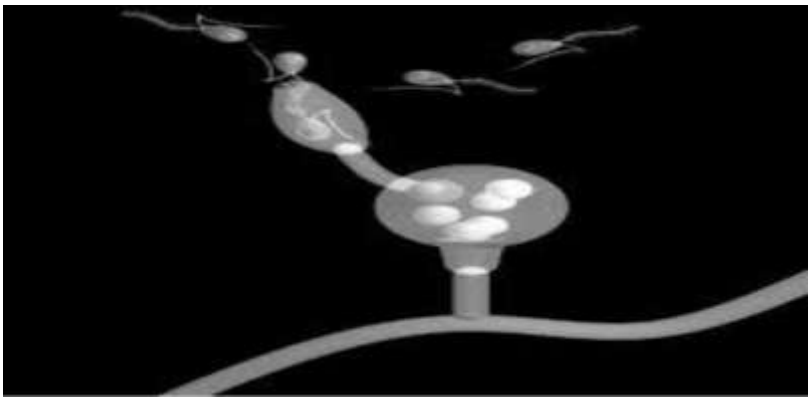
Albuginaceae, Pythiaceae, and Peronosporaceae.

1-Family: Pythiaceae

One of the main characteristics of this family is that the **sporangiophore** is **not distinctly different from the hypha**, meaning it resembles the vegetative filament. Its growth is **indeterminate**, a phenomenon called **proliferation**, in which a new sporangium can be formed on the same sporangiophore. Members of this family are **facultative saprobes or parasites**.

This family includes important fungi, some of which **cause human diseases**, such as **Pythiosis**, caused by species of the genus *Pythium*. The family includes the genera **Pythium** and **Phytophthora**.

- *Pythium* is commonly found in soil and causes a range of plant diseases, including **root and seed rot** and **damping-off** of seedlings.
- This fungus produces **globose sporangia**, from which a **vesicle** develops. The vesicle releases **biflagellate zoospores**.



- *Phytophthora* causes **late blight** in potato and tomato, as well as **citrus gummosis**.
- A distinguishing feature of *Phytophthora* is its **lemon-shaped sporangia** that terminate in a **papilla**, through which the zoospores are released.

2-Family: Albuginaceae

The **sporangiophore** is **distinct, short, and of limited growth**. Members of this family are **obligate intracellular parasites**.

The most important genus is **Albugo**, such as *Albugo candida*, which causes **white rust** on plants of the **Brassicaceae family**. White rust appears as **waxy white pustules** that result from sporangia breaking through the plant epidermis.

3-Family: Peronosporaceae

The **sporangiophores** are **distinct and vary in shape depending on the species**, with **limited growth**. Members of this family are **obligate intracellular parasites**.

They cause **downy mildew**, which is named after the **fuzzy appearance** resulting from the emergence of the fungus's spore-bearing sporangiophores.

Important genera include:

- *Plasmopara viticola*, which causes downy mildew on **grapevine**.
- *Peronospora destructor*, which causes downy mildew on **onion**.
- *Bremia lactuca*, which causes downy mildew on **lettuce**.