

Pathogenicity mechanism of fungi

Oomycetes

- The Oomycetes are one of the most important groups of fish pathogens.
- They resemble fungi, they are in fact more closely related to golden-brown algae, thus are not 'true fungi'.
- They are classified as Stramenopiles, which also includes the golden-brown algae and diatoms.
- They are filamentous, heterotrophic, and can reproduce both sexually and asexually.

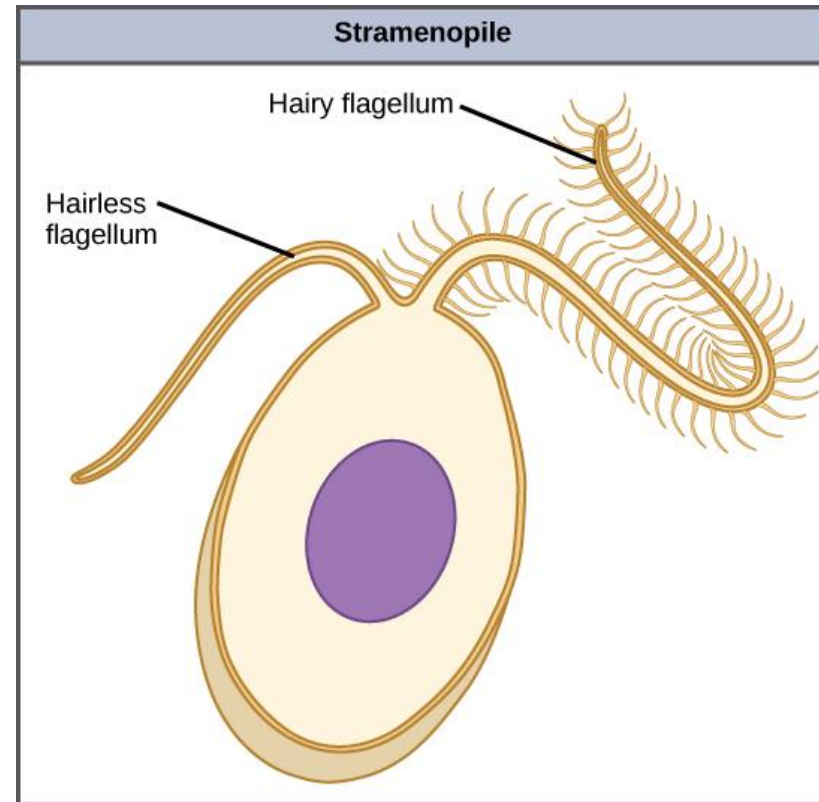
Stramenopiles

General characteristics

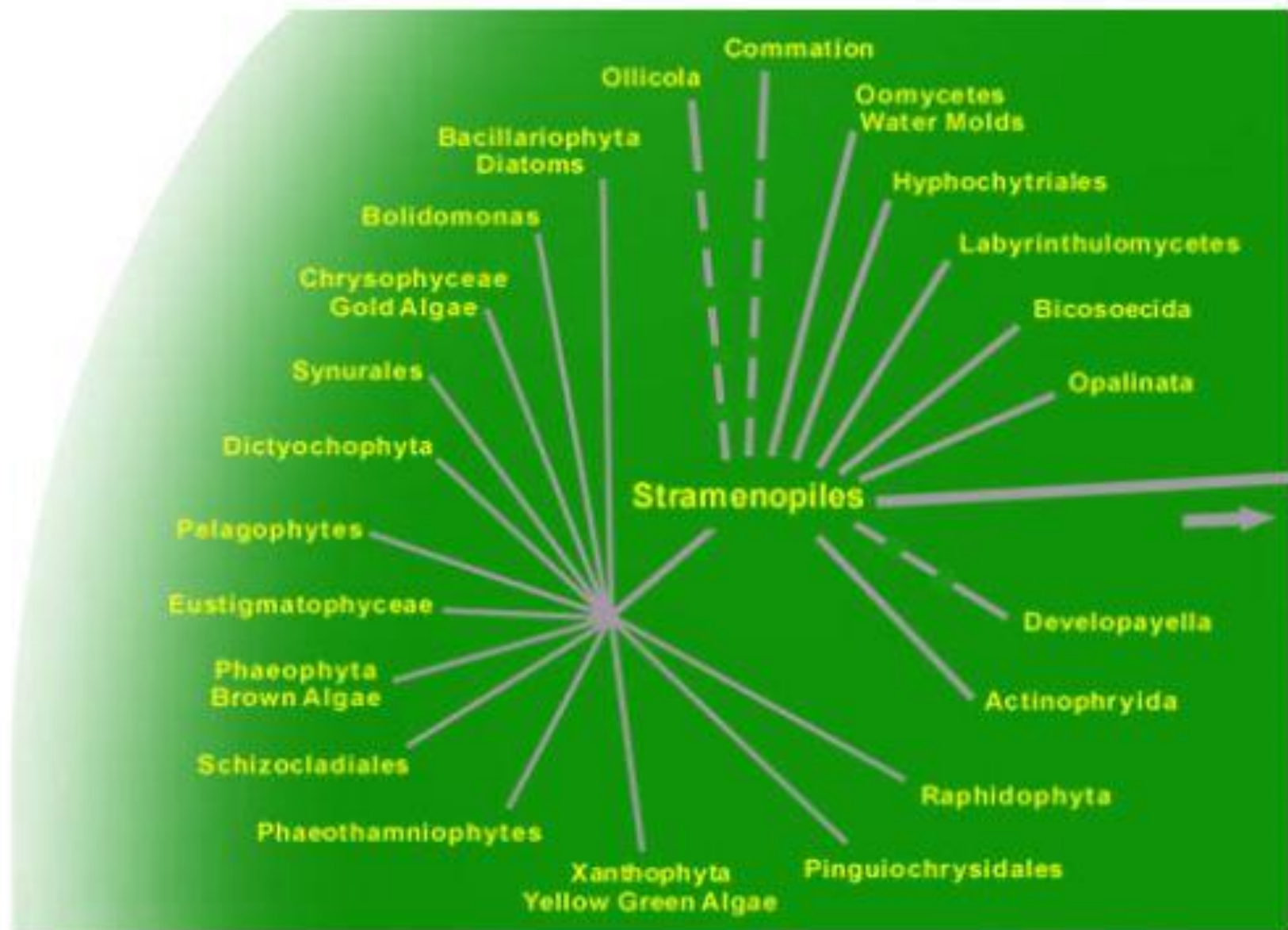
- Most are heterotrophs
- Flagellum contains tiny fine hairs but also smooth hairless extensions

Members of group

- Oomycetes
- Diatoms
- Golden Algae
- Brown Algae



Domain Eukaryota
Stramenopiles



- Taxonomically oomycetes are divided into three subclasses:
 1. Saprolegniomycetidae,
 2. Hipidiomycetidae
 3. Peronosporomycetidae

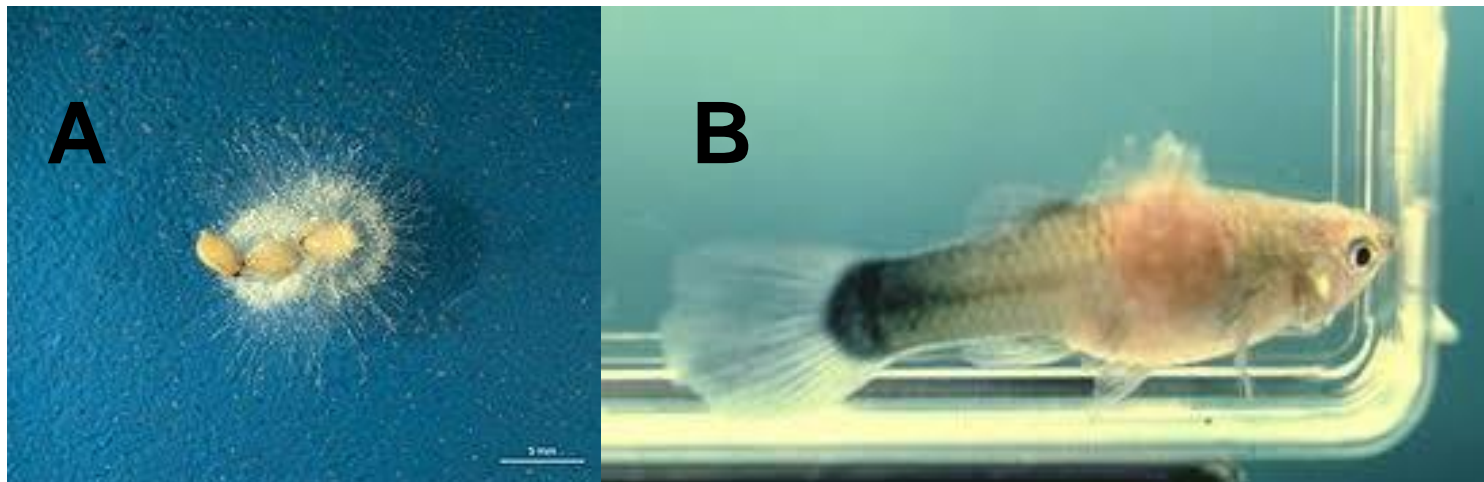


Fig:A- Saprolegnia spp, B- Saprolegnia infection in fish

- Most fish and animal pathogenic oomycetes belong to the Saprolegniomycetidae, which has two orders:

1. Saprolegniales

2. Leptomitales.

- Within the Saprolegniales, three main genera,

1. *Saprolegnia*

2. *Achlya*

3. *Aphanomyces*

➤ All are able to infect fish or shellfish.

➤ Saprolegniaceae are known as '**water moulds**' or **cotton moulds**.

Habits of Saprolegnia

- *Saprolegnia* is tolerant to a wide range of temperature, 3–33 °C but is more prevalent in lower temperatures.
- Found most frequently in freshwater, it will also tolerate brackish water and even moist soil.
- *Saprolegnia* filaments (hyphae) are long with rounded ends, containing the zoospores.
- When the mass of hyphae grows large enough in size to be seen without use of a microscope, it can be called a **mycelium**.
- Colonies are generally white in color, though they may turn grey under the presence of bacteria or other debris which has become caught in the fibrous mass.

Characteristics of infection

- *Saprolegnia* is generally a secondary pathogen.
- It most frequently targets fish, both in the wild and in tank environments.
- Through necrosis of the skin, *Saprolegnia* will spread across the surface of its host as a cotton-like film.
- Though it often stays in the epidermal layers, the mould does not appear to be tissue specific.

Clinical Signs

- *Saprolegnia* lesions are **focal grey-white patches** on the skin which have a **cotton wool-like** appearance under water when the hyphal elements extend out.
- The early lesions are circular and extend out until they merge.
- The patches can then become **dark grey or brown** as the mycelium traps mud or debris.
- The **head** region is most commonly involved, but any part of the skin or gills, even internal organs, can be affected.
- **Respiratory distress** may be evident if the gills are involved, and **death** can follow rapidly.



Diagnosis

- The clinical signs are quite characteristic.
- **Skin scrapes** examined under the microscope may help identify the fungal hyphae which belong to *Saprolegnia*.
- **Histopathology** reveals: the fungus invading the stratum spongiosum of the dermis and then the epidermis, causing erosions as it spreads.
- Numerous hyphae will be seen, and underneath, dermal necrosis and oedema.
- There is also a slight inflammatory response.

Treatment and Control

- A variety of chemical treatments can be used to control the infection, such as **malachite green, copper sulphate, potassium permanganate, salt and formalin.**
- Prevention involves maintaining fish under **good husbandry conditions**, by correcting nutrition, ensuring good water quality and avoiding overcrowding.
- Even so, fish may still succumb from the disease.