Department of biology

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((Mycology))

Stage (-3-)

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Phylum Zygomycota

By

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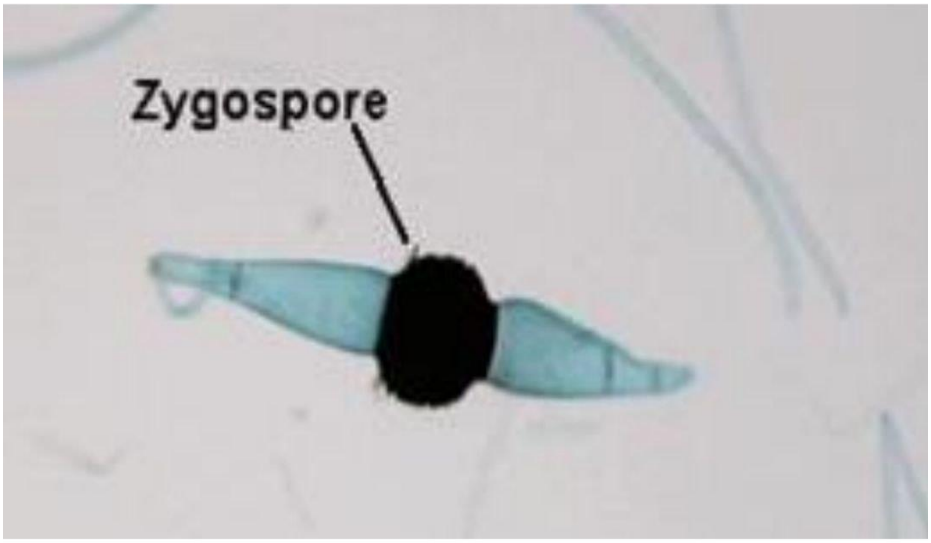
Phylum Zygomycota

The **Zygomycota**, also known as **conjugation fungi**, are sometimes referred to as **non-flagellated fungi**. Their **sexual spores** are **zygospores**, which are thick-walled; the phylum's name is derived from this type of sexual spore. **Sexual reproduction** occurs through the **fusion of gametangia**, forming a structure called a **zygosporangium**.



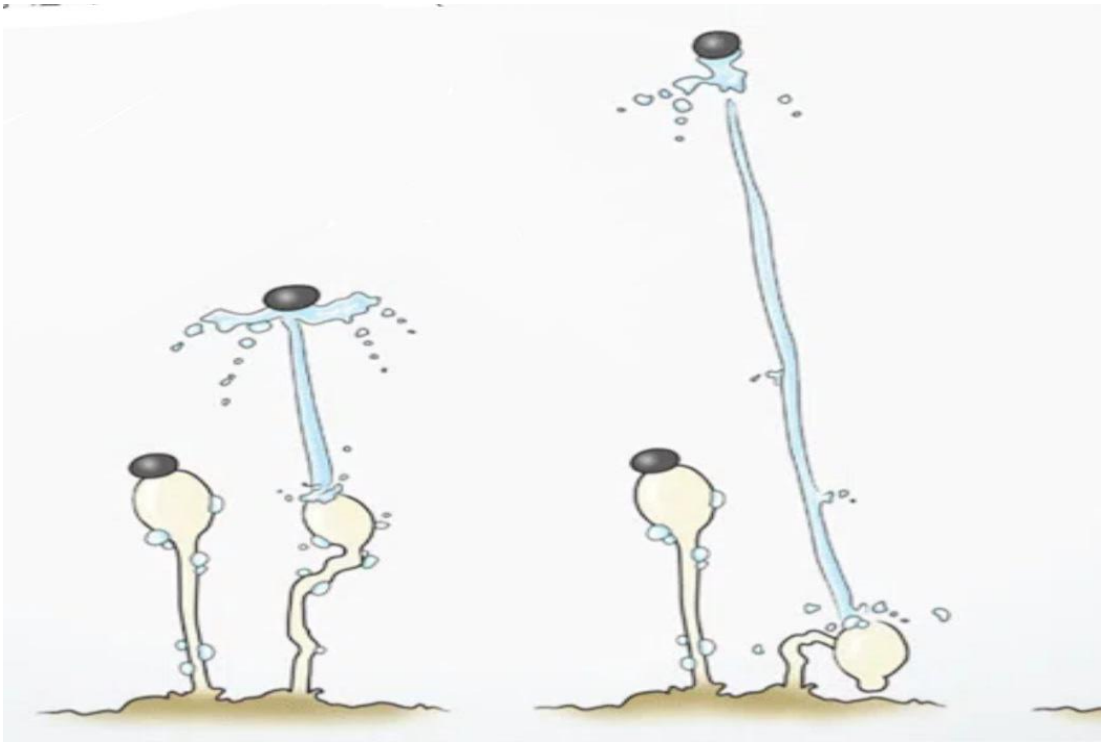
A notable feature of this phylum is the **absence of a motile, flagellated stage**. All their spores are **non-motile (stationary)**, yet they still retain a **coenocytic (non-septate) filamentous sexual stage**. Some species exhibit **dimorphic forms** (both filamentous and yeast-like).

Zygomycota are primarily **saprophytic fungi**, well-adapted to survive under harsh conditions. They feed on **simple sugars and starch**, while some are **parasitic on other organisms**.

Asexual reproduction occurs through the production of **non-motile spores**, which develop inside a **sporangium**, or via **chlamydospores, arthrospores, gametes, or oidia**. Interestingly, under **dry conditions**, sporangia can germinate as if they were **conidia**, representing an important **evolutionary adaptation**.

These fungi are found in **various habitats**, including **soil**, where they live saprophytically on organic matter, as parasites on **insects and plants**, and some form **symbiotic associations with plant roots**. They are sometimes called **"sugar fungi"** due to their ability to break down sugars with specialized enzymes.

Some species, such as **Pilobolus sp.**, exhibit a remarkable feature: their **sporangia can shoot spores over long distances**, sometimes several feet, at high speed due to high internal pressure, earning them the nickname **"shoot gun fungi"**. Additionally, some species have developed **traps and mechanisms to capture insects and nematodes**.



Economic Importance of Zygomycota

The economic importance of **Zygomycota** is significant:

- **Saprophytic activity** causes **spoilage of stored foods** such as **bread, grains, juices, fruits, cheeses, and industrial products**.
- Some species form **symbiotic relationships with plants**.
- Others **parasitize insects** and are used in **biological control**.
- Certain species are involved in the **production of organic acids**.
- Some species are **parasitic on humans**, causing infections of the **ear, nose, and eyes**, and in severe cases may affect the **brain and heart**, potentially contributing to **cancer development**.

This phylum represents about **1% of the fungal kingdom**, comprising approximately **800 species, 120 genera, 29 families, and seven orders**, all classified under **Class Zygomycetes**.

Here, we will focus on two important orders:

Order Mucorales

This is the **largest and most important order** of Zygomycota.

- Most species produce **sporangia** on **sporangiophores**.
- Some are **opportunistic pathogens** on plants and animals.
- Rarely, they parasitize humans, causing **cutaneous, subcutaneous, and systemic infections**, collectively known as **Mucormycosis**.

Family Mucoraceae is a key family in this order and includes the following genera:

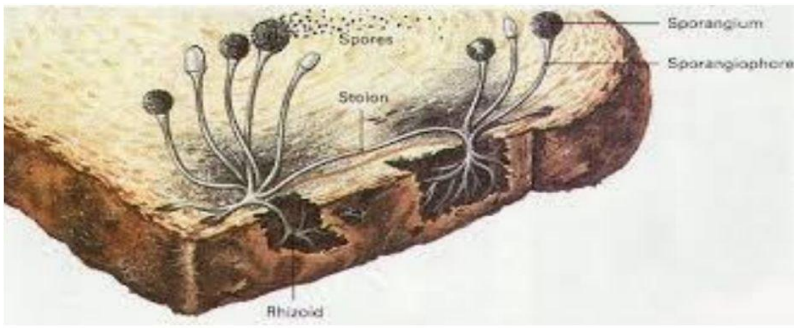
- **Mucor sp.**
- **Rhizopus sp.**
- **Absidia sp.**

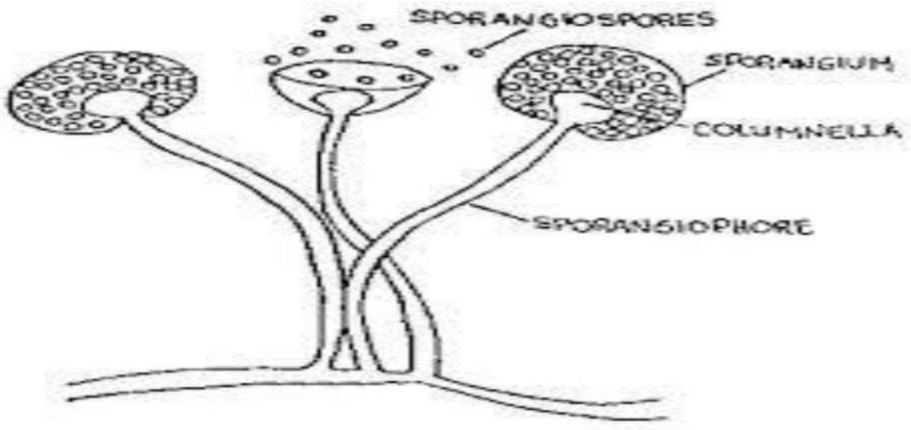
Rhizopus sp. (commonly called **bread mold**) grows on bread left exposed. Its **thallus** is composed of **non-septate, branched hyphae**. Colonies appear **grayish**, later darkening, with a **cottony texture**. The fungus produces **stolons** and **rhizoids**, which develop at the points where **sporangia** are formed. The **sporangia** are **spherical** and supported on **sporangiophores**, often forming **clusters**.

The spores of these fungi are **dark-colored**, and the fungus causes **spoilage of stored grains, fruits, juices, and cheeses**, and parasitizes some **high-moisture plants** such as **strawberries, eggplants, and sweet potatoes**. The disease it causes is known as **soft rot** or **mushy rot disease**.

It can cause **blossom-end rot** in greenhouse-grown **squash plants**, and may also lead to **respiratory and skin infections in humans**. The fungus **grows rapidly on culture media**, is **resistant to antifungal agents**, and produces **stolons** that help it quickly colonize and occupy the substrate.

- After releasing spores, the **sporangium** assumes a **parasol-like shape**.
- **Mucor sp.** is similar, except that its **rhizoids are not located beneath the sporangiophore**, appearing elsewhere, the **sporangiophores differ in structure**, not forming clusters, and the **sporangium takes on a cup-like shape** after releasing spores.





Mucor sp

Order Entomophthorales

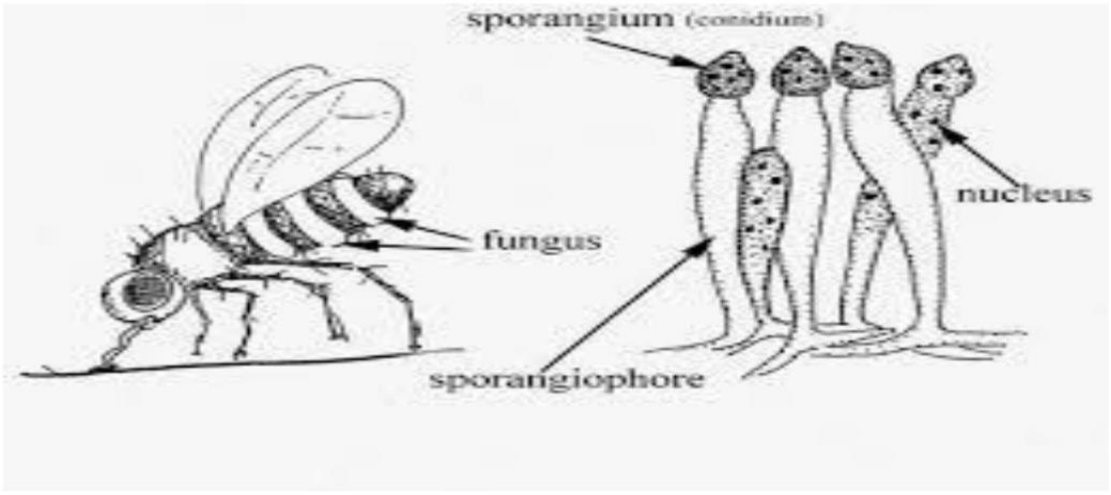
The order **Entomophthorales** is known for its **parasitism on arthropods, especially insects**.

- It includes **Family Entomophthoraceae** and **Genus Entomophthora sp.**
- The name **Entomophthora** is derived from two components meaning **"insect destroyer"**, highlighting its role as an **insect pathogen**.

For example, **Entomophthora muscae** parasitizes **flies and their larvae**:

1. The fungus enters the insect's body as **spores** through **thin regions**, such as **wounds** or **intersegmental membranes**.
2. The spores **germinate** and feed on the fly's **internal organs and body fluids**.
3. As the infection progresses, the fly becomes **weak**, eventually settling on a **solid surface and dying**.

- This phenomenon is commonly observed in **early and late summer**.
- Examination of infected flies reveals **white fungal growths**, especially around the abdomen. These growths are the **fungal sporangiophores and sporangia**, which release spores to **infect new insects**.



E.muscae