TP 02 : Fungi & Lichens

A- Fungi

Fungi are ubiquitous microorganisms that play a significant role in the decomposition of organic matter. When bread is exposed to moisture and left in a warm environment, it provides an ideal substrate for fungal growth. Two common fungi that colonize moist bread are ***Rhizopus nigricans*** and ***Penicillium*** **species.**

Rhizopus nigricans is a fast-growing mold that appears as a cotton-like white mycelium before developing black sporangia. It belongs to the Zygomycota group and thrives on simple sugars, making bread an ideal medium for its rapid colonization. As a saprophytic fungus, it plays a crucial role in breaking down carbohydrates and recycling nutrients.

On the other hand, ***Penicillium*** is a filamentous fungus that appears later in the process, forming blue-green mold patches. Unlike *Rhizopus*, it belongs to the Ascomycota group and reproduces through conidia, which are asexual spores. Some species of *Penicillium* are beneficial, being used in antibiotic production (penicillin) and cheese fermentation, while others contribute to food spoilage.

The simultaneous growth of *Rhizopus nigricans* and *Penicillium* on bread illustrates the natural process of fungal succession, where different species colonize and utilize available nutrients in sequence.

Fig 01 : *Several types of fungi invade bread.*

Microscopic Study of *Rhizopus nigricans* and *Penicillium sp.*

Objective :

To observe and study the growth and the morphological structures of *Rhizopus nigricans* (bread mold) and *Penicillium sp.* under a light microscope.

Materials :

- Slice of bread
- Petri dish
- Distilled water
- Forceps and Scalpel
- Glass slides and coverslips
- Light microscope

Method :

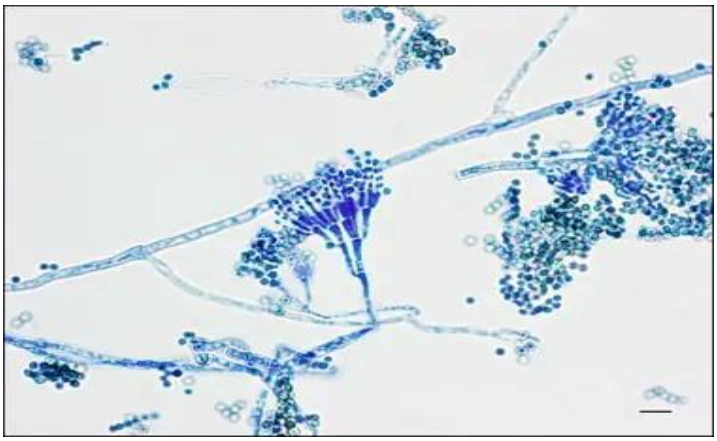
1. Preparing the Bread Sample :

Take a fresh slice of bread and slightly moisten it with distilled water. Place the bread inside a Petri dish. Cover the dish with a glass plate to prevent desiccation while allowing air exchange. Keep the dish at room temperature (20 to 25°C) in a dark place for a few days.

2. Microscopic Observation:

After a few days, using forceps, carefully take a small portion of the mold from the bread. Place it on a glass slide, add a drop of distilled water and place a coverslip over the sample. Start with low magnification and increase magnification (40x) to observe details.

Results: Draw and label the structures observed under the microscope.



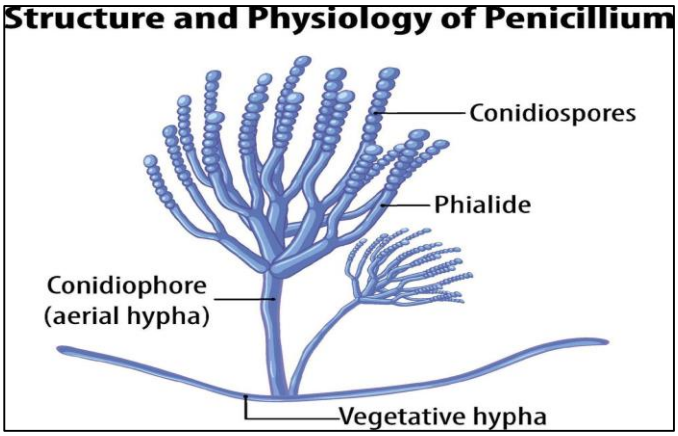


Fig 02 : *Penicilium sp.*

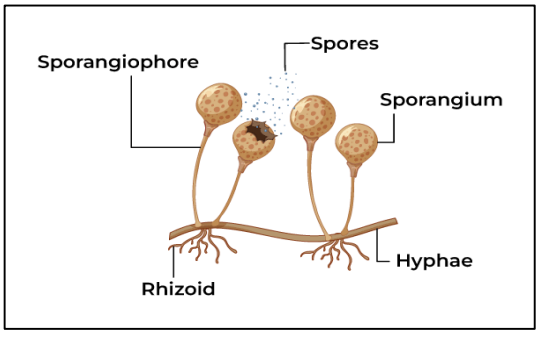


Fig 03 : *Rhyzopus nigricans*

B- Lichens

Lichens are unique symbiotic organisms formed by the mutualistic association between a fungal partner (mycobiont) and a photosynthetic partner (photobiont), which is usually an alga or cyanobacterium. This relationship allows lichens to thrive in diverse and often extreme environments, including tree bark, rocks, and exposed surfaces. They play a crucial role in ecosystems by contributing to soil formation, acting as bioindicators of air quality, and supporting various organisms.

One well-known lichen species is *Xanthoria parietina*, commonly referred to as the sunburst lichen. It is characterized by its bright yellow to orange thallus, which contains pigments that protect it from ultraviolet radiation. *Xanthoria parietina* is frequently found on tree bark, rocks, and man-made structures, particularly in areas with moderate air pollution, as it can tolerate higher nitrogen levels. Its algal partner, usually from the genus *Trebouxia*, provides carbohydrates through photosynthesis, while the fungal component offers structural support and protection.

As an indicator species, presence and distribution of *Xanthoria parietina* can reflect atmospheric pollution levels, particularly nitrogen compounds from agriculture and urbanization.

Microscopic Study of *Xanthoria parietina*

Objective : To examine the structural organization of *Xanthoria parietina* under a light microscope and identify its key components, including fungal hyphae and algal cells.

Materials:

- *Xanthoria parietina* lichen sample
- Glass slides and coverslips
- Forceps & Scalpel
- Distilled water
- Light microscope

Method:

Collect a fresh *Xanthoria parietina* lichen sample from a tree bark or rock surface. Carefully clean the sample to remove dirt and debris. Using a scalpel, make a thin cross-section of the lichen thallus. Place the section onto a glass slide. Add a drop of distilled water to hydrate the section and place a coverslip over the section. Under the microscope, try to Identify the following structures :

- **Upper cortex** : Compact fungal hyphae providing protection.
- **Photobiont layer** : Algal cells (Trebouxia sp.) involved in photosynthesis.
- **Medulla** : Loosely arranged fungal hyphae.
- **Lower cortex** (if present) : Protective layer anchoring the lichen.

Results : Draw and label the structures observed under the microscope.

Fig 04 : *Xanthoria parietina*

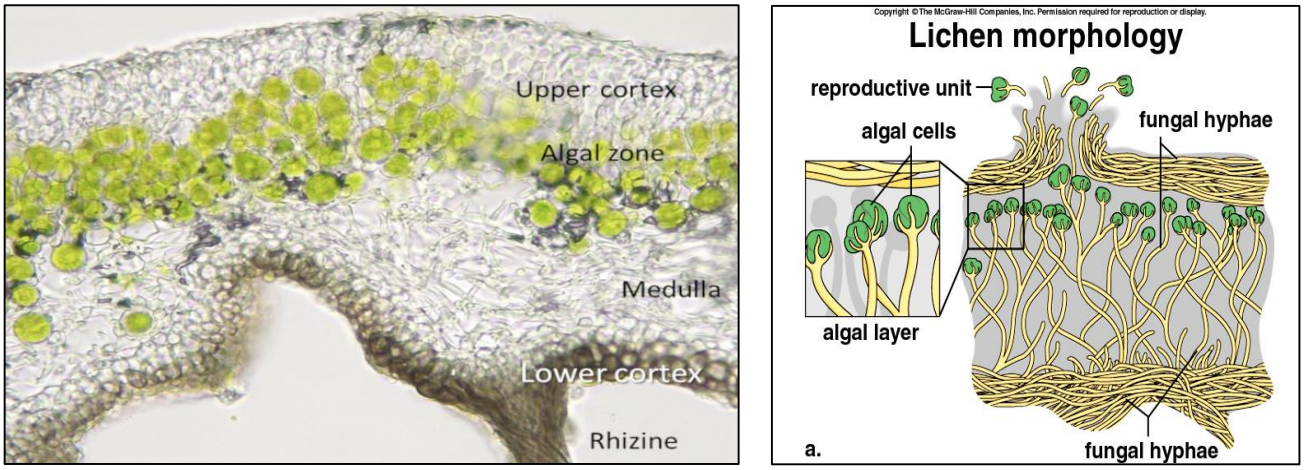


Fig 05 : *Lichens under microscope*

Classification : *Classification of the 03 species*

Domain	Eukaryota	Eukaryota	Eukaryota
Kingdom	Fungi	Fungi	Fungi
Division	Ascomycota	Mucoromycota	Ascomycota
Class	Eurotiomycetes	Mucoromycetes	Lecanoromycetes
Order	Eurotiales	Mucorales	Teloschistales
Family	Aspergillaceae	Mucoraceae	Teloschistaceae
Genus	***Penicillium***	***Rhizopus***	***Xanthoria***
Species	***sp***	***Nigricans***	***parietina***