



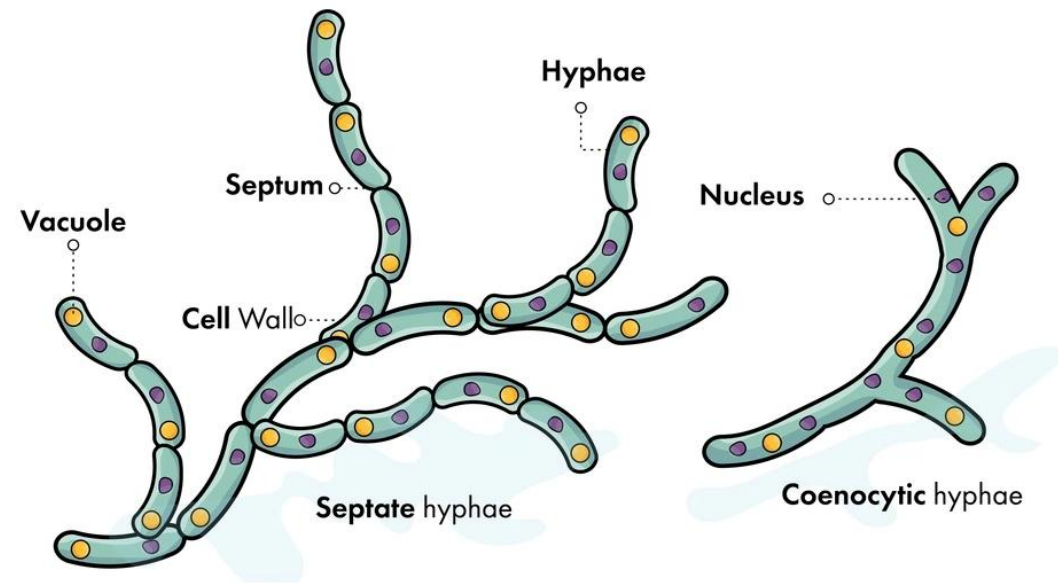
Fungi

Prepared by: Besir Zeneli

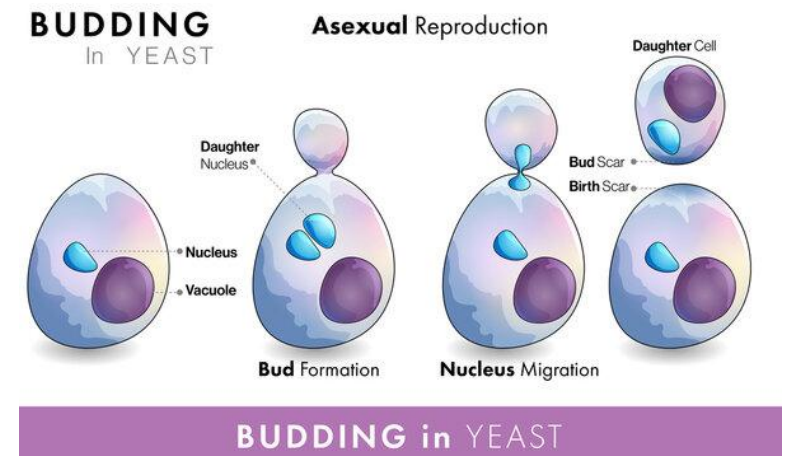
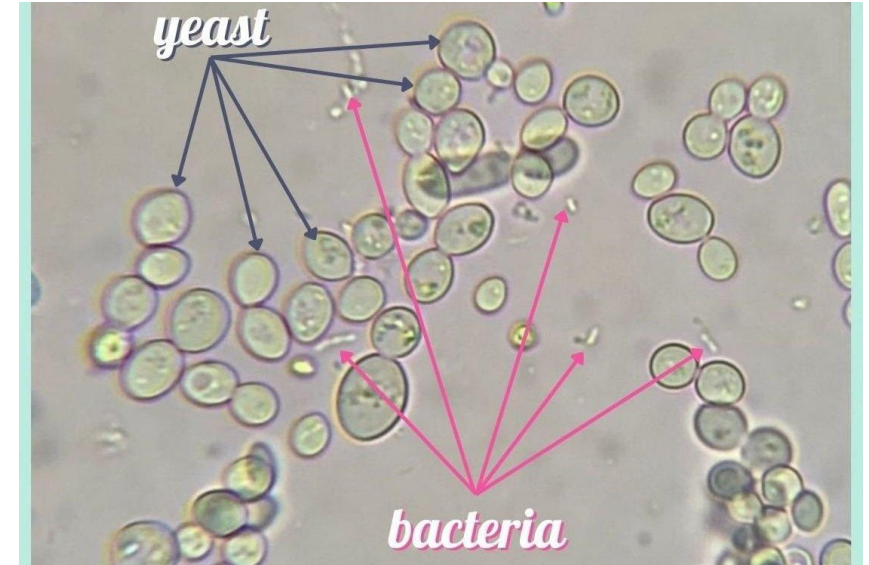
Structure of fungi

- Hyphae – thread-like tubes; mass of many cells.
- Hyphae produce enzymes that break down food outside. When food is broken down, fungal cells then absorb it. For this reason, they are called saprophytes.
- Saprophytes are organisms that obtain food by absorbing dead or decaying tissues of other organisms.

Hyphae of fungi

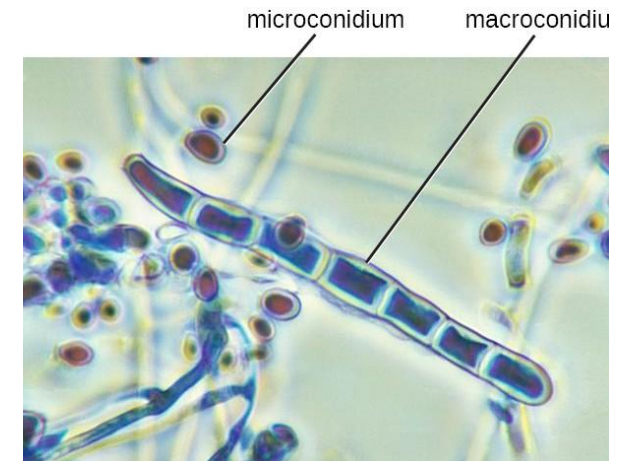
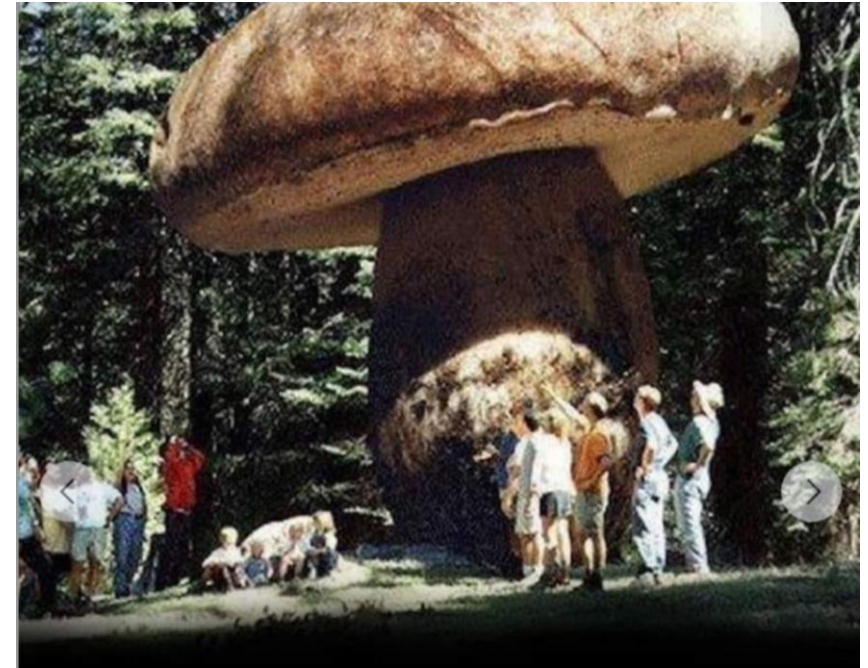


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- Fungi are many-celled.
 - But yeast is single-celled.
 - Sometimes they reproduce sexually by spores.
 - But sometimes they reproduce asexually by a process called budding.
 - Budding results in a daughter cell identical to the parent cell.



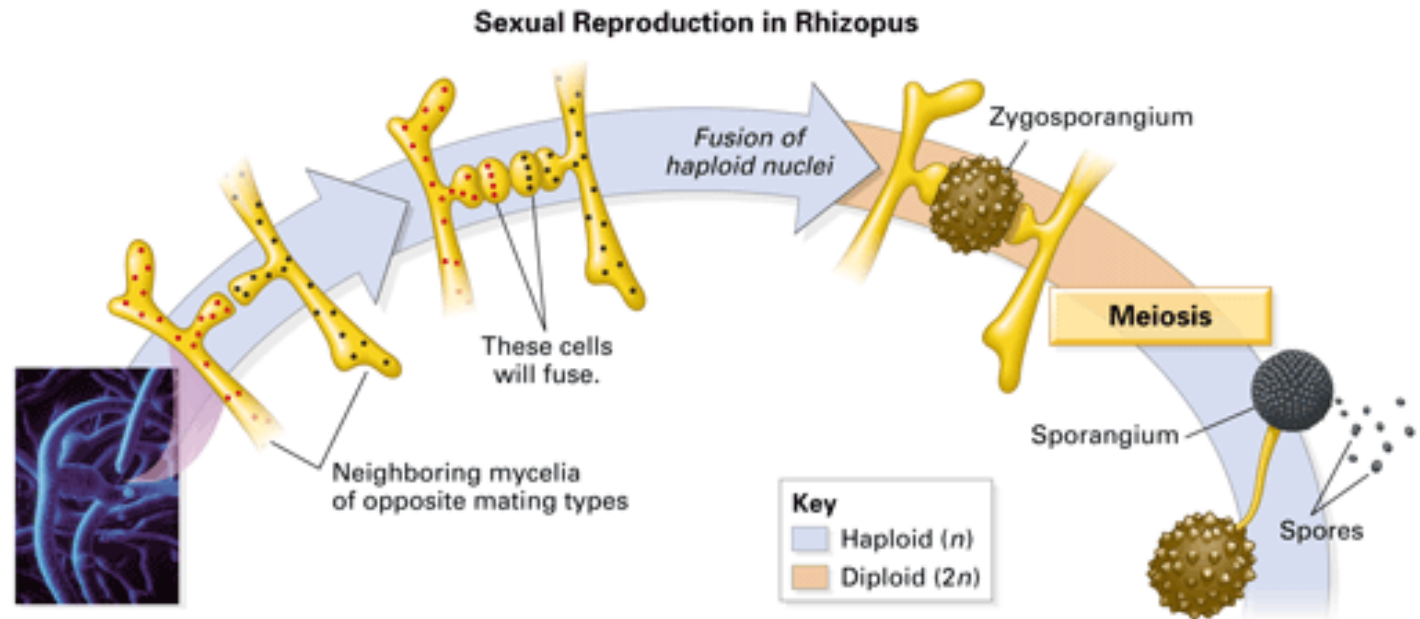
Macroscopic fungi and Microscopic fungi

- They grow best in warm and humid areas.
- Some fungi are microscopic, but some of them are macroscopic.
- You need a microscope to see some fungi, but in Michigan one fungus was found growing underground over an area of about 15 hectares. In the state of Washington, another type of fungus found in 1992 was growing throughout nearly 600 hectares of soil.



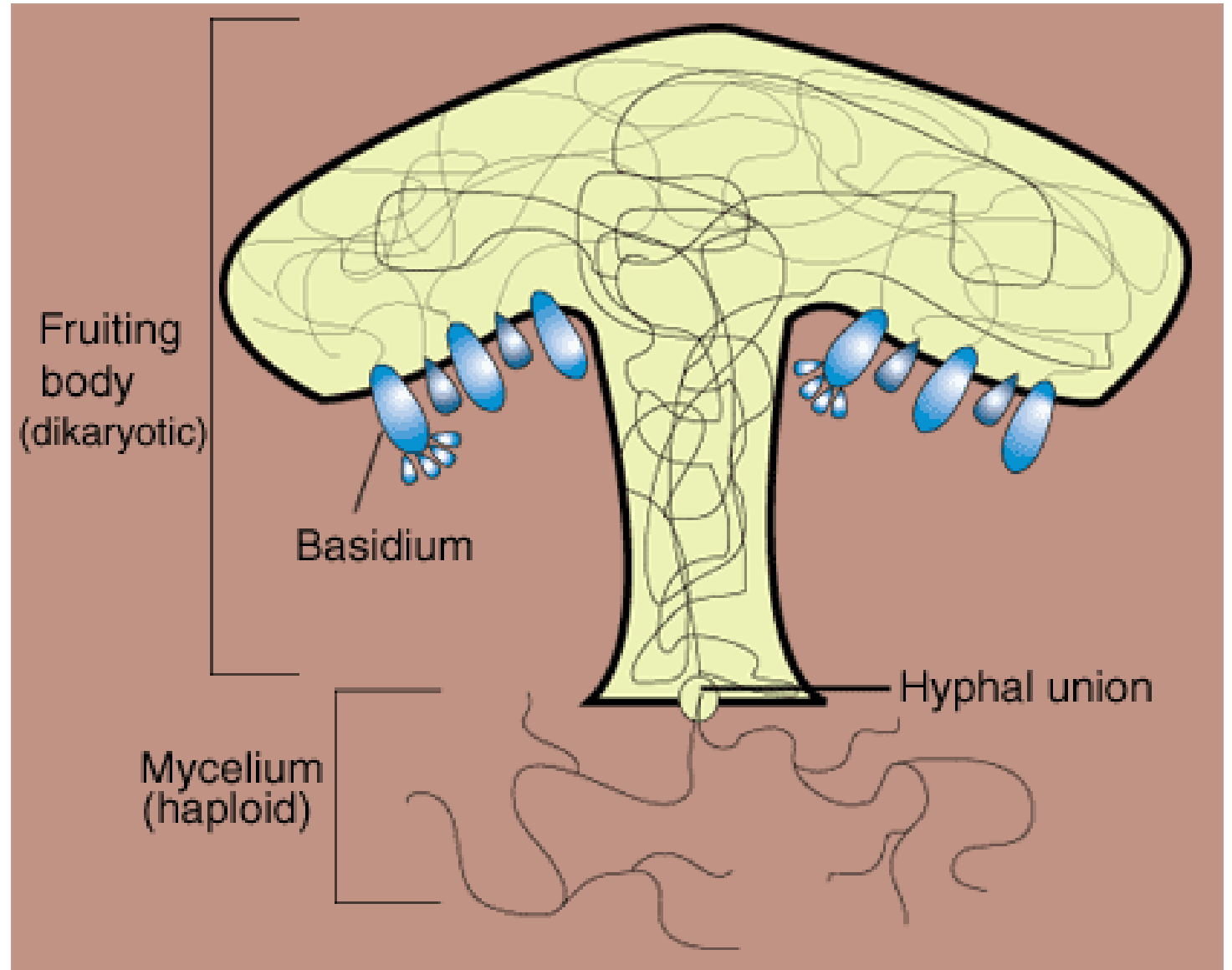
Reproduction

- Asexual and sexual reproduction.
- They reproduce through **spores**.
- In **asexual reproduction**, a spore will grow into an identical organism.
- In **sexual reproduction**, the hyphae of two different individuals of the same species fuse and result into a Zygosporangium.
- Fungi are classified into three main groups based on the type of structure formed by the joining of hyphae.



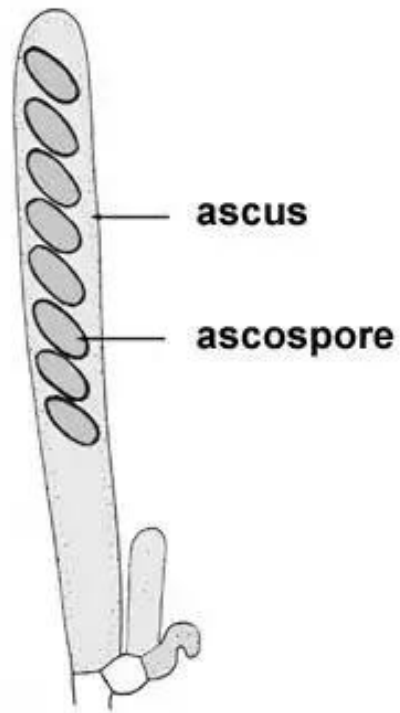
1. Club Fungi

- The type of fungus that you are most familiar with.
- Most of the fungus grow as hyphae in the soil or on the surface of its food source.
- The basidiospores are produced in basidium.



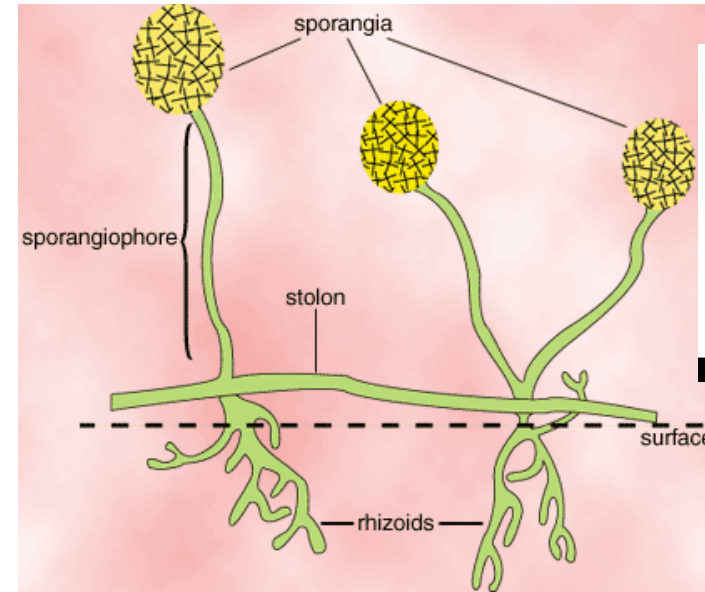
2. Sac Fungi

- Yeasts, molds, morels and truffles.
- Diverse group with more than 30 000 species.
- Spores of these fungi (ascospores) are produced in ascus (sac-like structure).



3. Zygo fungi

- The fuzzy black mold that you sometimes find growing on a piece of fruit or an old loaf of bread.
- Fungi that belong to this group produce spores in a round spore called **sporangium**.



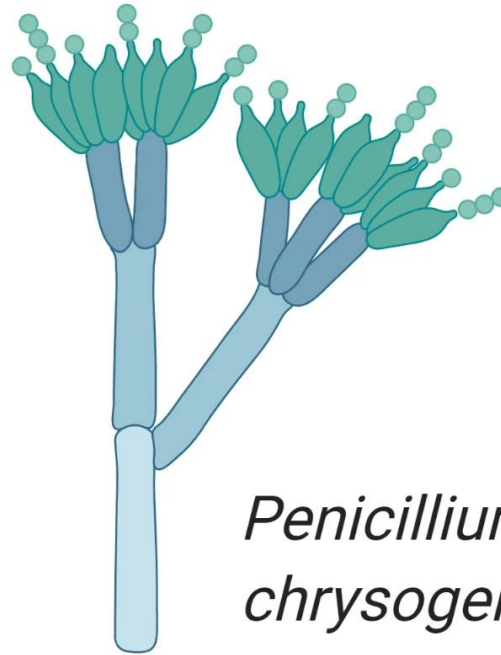
(a)



(b)

Penicillium

- Penicillium is a fungus.
- The antibiotic called penicillium that is used against bacteria is produced by this type of fungus.



*Penicillium
chrysogenum*

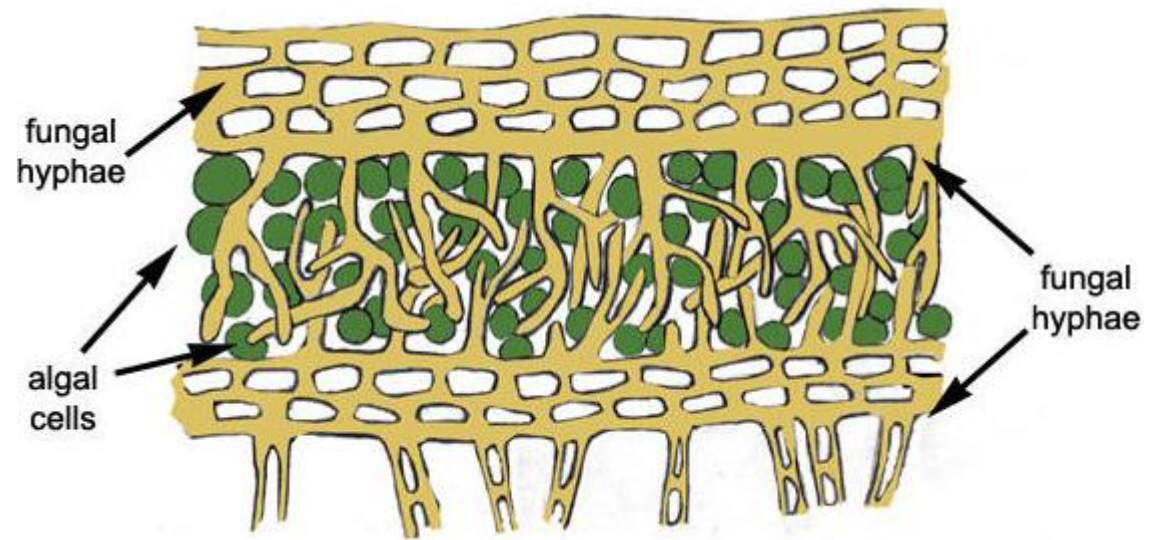


Lichens

Lichen is an organism that is made of a fungus and either a green alga or a cyanobacterium.

These organisms have a relationship of win-win situation.

The fungus get the food made by green alga or cyanobacterium. The green alga or cyanobacterium gets a moist and protected place to live.



Importance of lichens

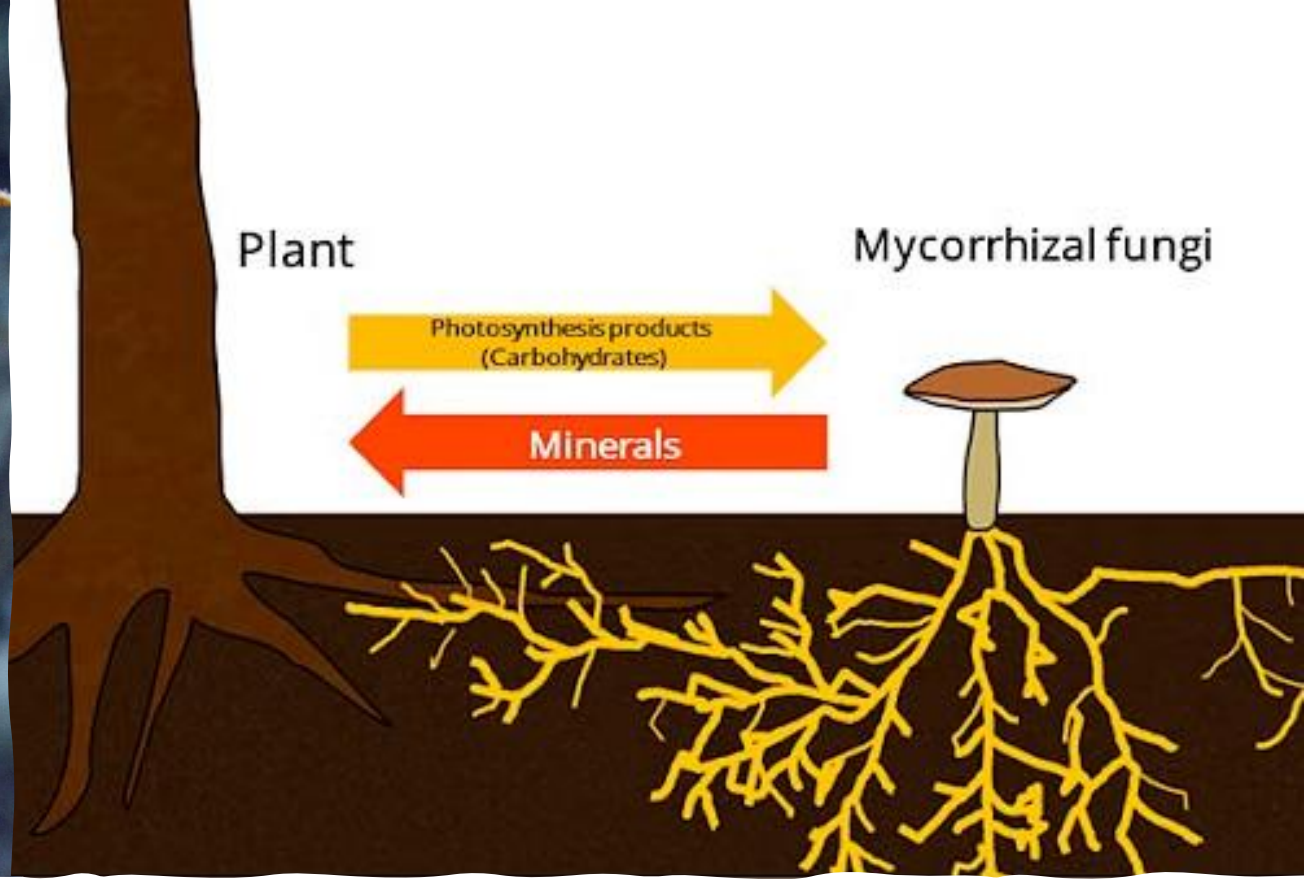
- Caribou and musk oxen feed on lichens.



Importance of lichens

- Lichens also are important in the weathering process of rocks.
- They grow on bare rock and release acids as part of their metabolism. The acids help break down the rock. As bits of rock accumulate and lichens die and decay, soil is formed. This soil supports the growth of other species.
- Scientists also use lichens as indicator organisms to monitor pollution levels. Many species of lichens are sensitive to pollution. When these organisms show a decline in their health or die quickly, it alerts scientists to possible problems for larger organisms.





Mycorrhizal fungi

- Some fungi interact with plant roots. They form a network of hyphae and roots known as mycorrhizae.
- About 80 percent of plants develop mycorrhizae. The fungus helps the plant absorb more of certain nutrients from the soil better than the roots can on their own, while the plant supplies food and other nutrients to the fungi. Some plants, like the lady's slipper orchids, cannot grow without the development of mycorrhizae



Importance of fungi

- Some fungi are eaten for food.
- Some cheeses are produced using fungi.
- Yeasts use sugar for energy and produce alcohol and carbon dioxide as a waste product. That carbon dioxide causes doughs to rise.
- However, wild mushrooms never should be eaten.

Agriculture

Dutch elm disease

Dutch elm disease – (referred to as DED) is a costly and deadly disease that affects all species of elm trees in Alberta. It is caused by a fungus that clogs the elm tree's water conducting system, causing the tree to die.

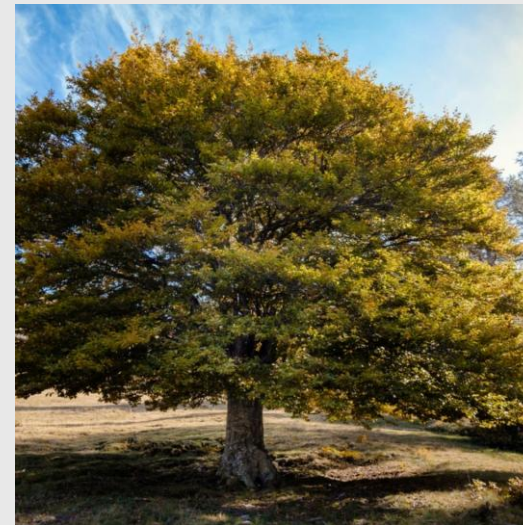
Apple scab.

Apple scab is a common disease of plants in the rose family (Rosaceae) that is caused by the ascomycete fungus *Venturia inaequalis*.

Ergot disease.

Ergot is a plant disease caused by the fungus *Claviceps purpurea*, which infects the developing grains of cereals and grasses

They cause billions of dollars worth of damage to food crops each year.

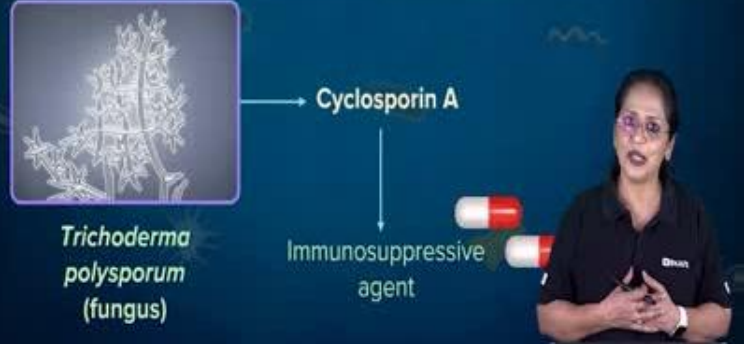


Health and Medicine

- The effects of fungi on health and medicine are not all negative. Some species of fungi naturally produce antibiotics that keep bacteria from growing on or near them. The antibiotic penicillin is produced by the imperfect fungi *Penicillium*. This fungus is grown commercially, and the antibiotic is collected to use in fighting bacterial infections.
- Cyclosporine, an important drug used to help fight the body's rejection of transplanted organs, also is derived from a fungus.

• Cyclosporin A is a microbial product produced by fungus *Trichoderma polysporum*, and used as an immunosuppressive agent in organ transplant patients.

• This helps them to suppress the activity of the immune system and ensures that the new organ is not rejected by the recipient.



Trichoderma polysporum (fungus)

Cyclosporin A

Immunosuppressive agent



Fungi as decomposers

- Food scraps, clothing, and dead plants and animals are made of organic material.
- Often found on rotting logs, fungi break down these materials. The chemicals in these materials are returned to the soil where plants can reuse them.
- Fungi, along with bacteria, are nature's recyclers. They keep Earth from becoming buried under mountains of organic waste materials

