

22 - Fungi

Learning objectives

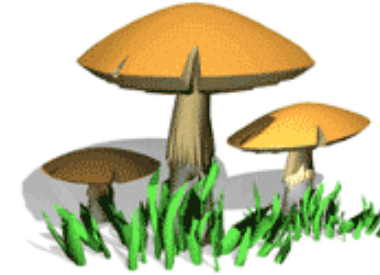
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- To describe the eukaryotic nature of fungi
- To understand fungal nutrition and describe the difference between saprophytic and parasitic fungi
- To appreciate that some fungi are edible and some are poisonous
- To describe the structure and life cycle of *Rhizopus*
- To describe the structure and reproduction of yeast
- To understand the economic importance of fungi and give two examples of beneficial fungi and two examples of harmful fungi
- To define the terms 'asepsis' and 'sterility' and understand the precautions that should be taken when handling micro-organisms
- To investigate the growth of leaf yeast.



22 - Fungi

Main Characteristics



They reproduce by means of **spores**.

They lack chlorophyll and are **heterotrophic**.

They do not ingest food but instead they secrete enzymes onto their food and then absorb the nutrients through their **rhizoids**.

They have cell walls made of **chitin** (same as insects).

The body is made of **hyphae**, (these are tubes).

The hyphae all join together to make **mycelium**.

Edible and Poisonous Fungi

Edible fungi - Field mushrooms, truffles, honey rot



Poisonous fungi - Death Cap, destroying angel



Nutrition

Parasites

These live off a live host and cause harm.
e.g. athlete's foot or ringworm.



Obligate parasites - can only live off a host and not on their own. e.g. smuts and rusts.



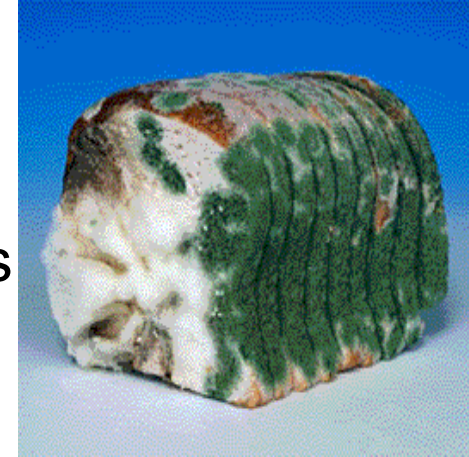
Saprophytes

Most fungi are saprophytes and these live off dead material. e.g. ear fungus on dead wood. They are essential for recycling nutrients.



Common Bread Mould (Rhizopus)

This fungus grows on the starch in bread, vegetable peelings and stored fruits. Digestion takes place outside of the fungus and the nutrients are absorbed.



Structure

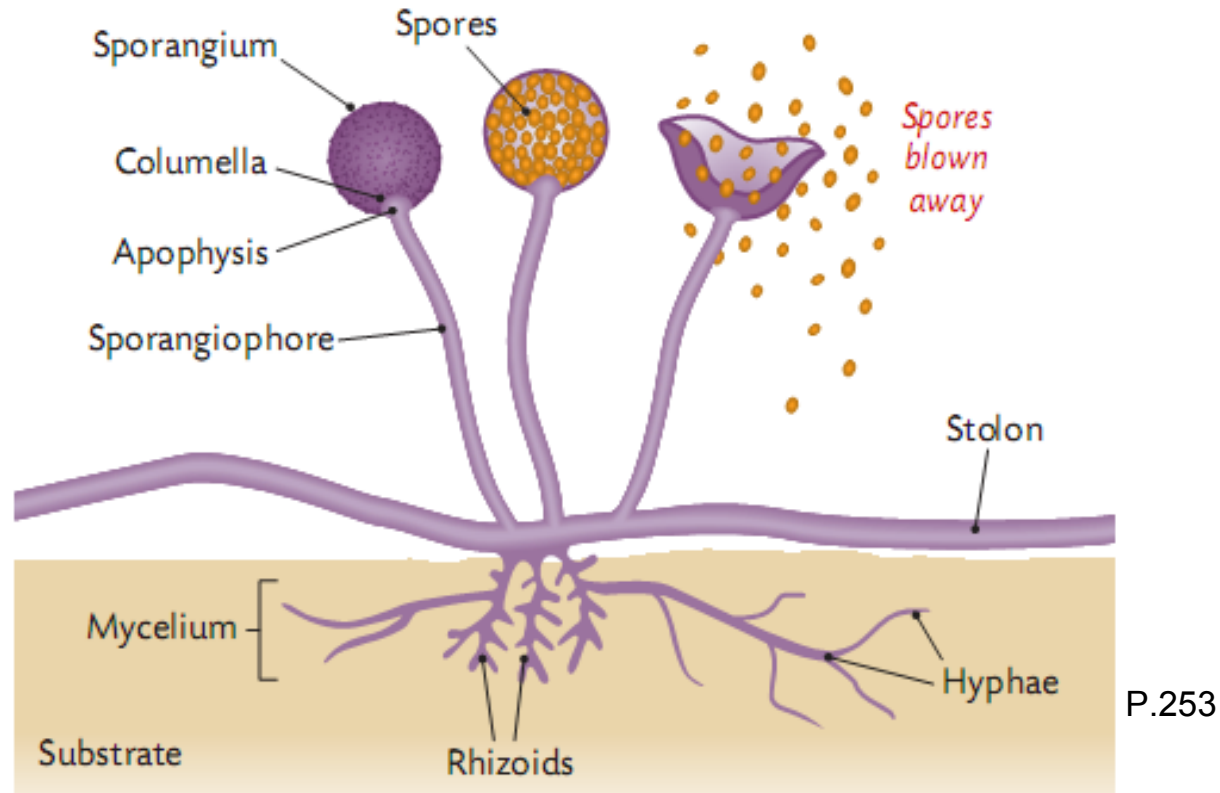
The mould is often called **pin mould** as its reproductive structures look like pins.

Tubes called **hyphae** form a big mass called a **mycelium**.

The hyphae digest and absorb the starch in the bread.

A **stolon** is an aerial hyphae (stands up) which allows the mould to spread more quickly.

Structure of Rhizopus



Life Cycle of Rhizopus

Asexual Reproduction

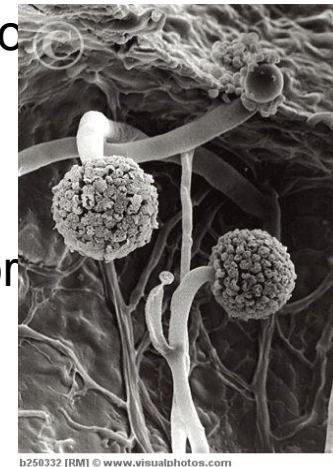
After a few days of growth some hyphae grow up into the air. These are called sporangiophores. Their tips swell to produce a sporangium. Spores inside this divide by mitosis to make many spores. **Sporulation** - is the process of making spores. The spores are all haploid.



In dry conditions this sporangium bursts and releases all the spores. If a spore lands on more starch it will start to grow into a new hyphae (fungus).

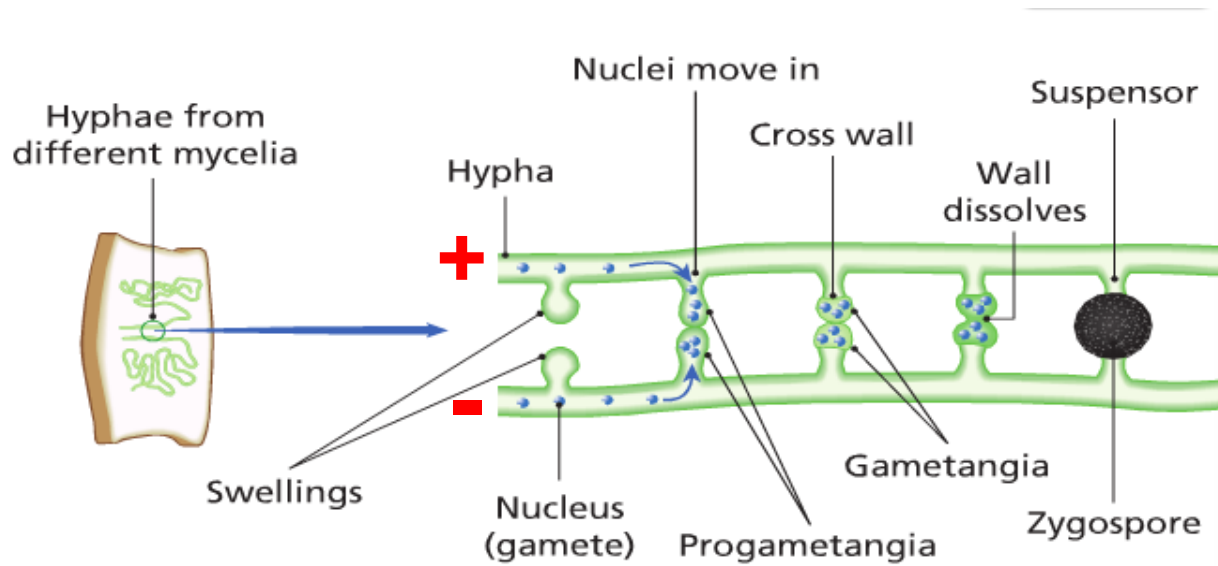
Sexual Reproduction

Rhizopus doesn't have a male or female but we call them + or - strain. Both look identical but sexual reproduction needs a plus and a minus strain to happen.



Sexual Reproduction

1. Hyphae from opposite strains grow close together.
2. Swellings form opposite each other.
3. The swellings touch.
4. Nuclei (gametes) move into each swelling.
5. Cross walls form and form gametangia.
6. The walls dissolve.
7. Many fertilisations happen to make diploid zygote nuclei.
8. A tough walled black zygosporium forms around the nuclei.
9. Zygosporium germinates by meiosis when conditions are right.
A haploid hyphae grows out and makes a sporangiophore with a sporangium.
This produces new haploid spores which can grow.





Rhizopus - black bread mold



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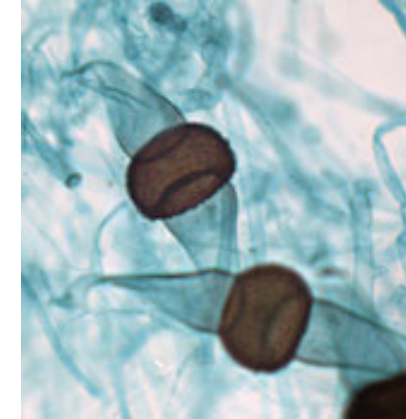
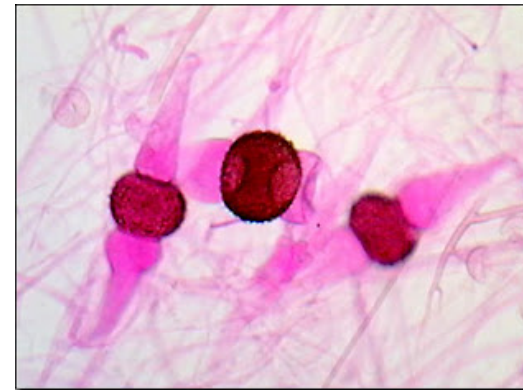
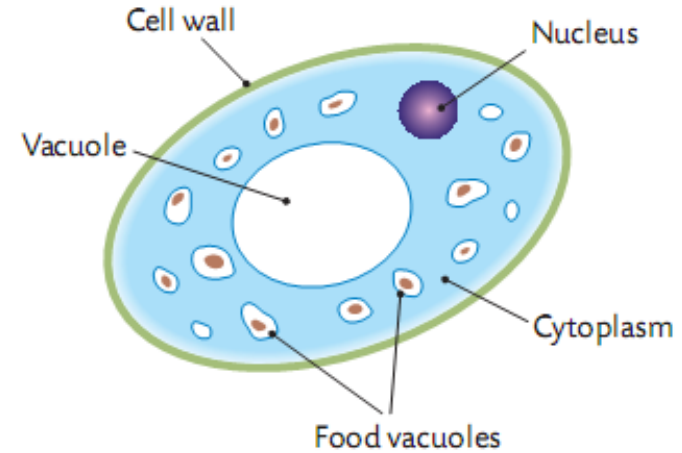


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Yeast

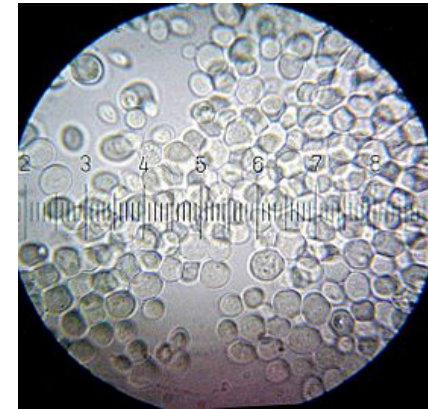
Many different fungi have a yeast stage.
Another name for yeast is **Saccharomyces**.
They can be round or oval in shape.
They can usually only be seen with an electron microscope.



Yeast have thin walls made of **chitin**.
They have a thick cytoplasm with many food storage **vacuoles**.

Respiration

Yeasts respire **anaerobically** (without Oxygen) and break down glucose to produce **ethanol** (alcohol) and Carbon Dioxide.



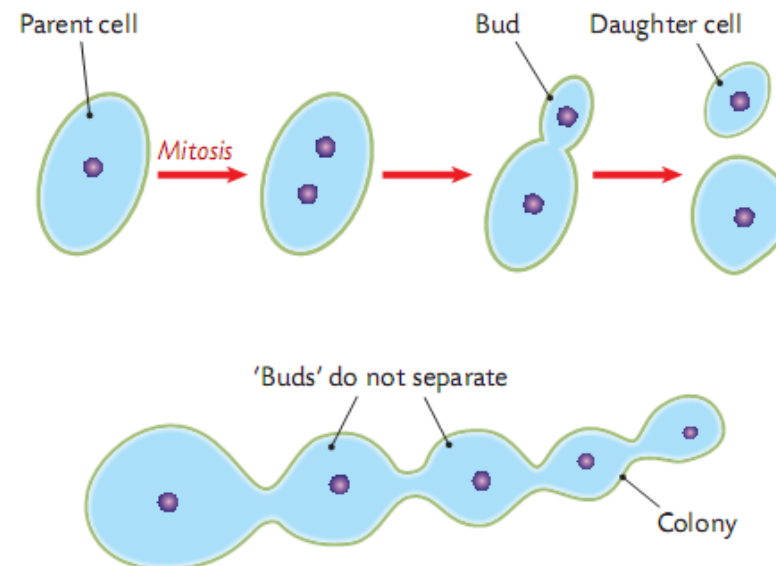
Reproduction

Asexual Reproduction

This is done by **budding**.

The parent cell divides by Mitosis and the new nucleus and cytoplasm enter the new cell.

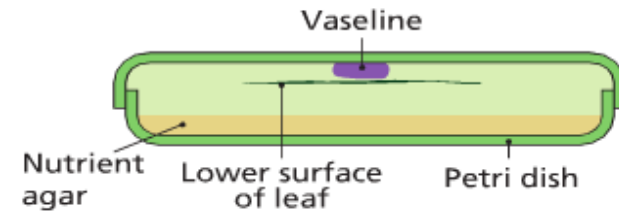
If the buds don't separate they form a **colony**.



Experiment

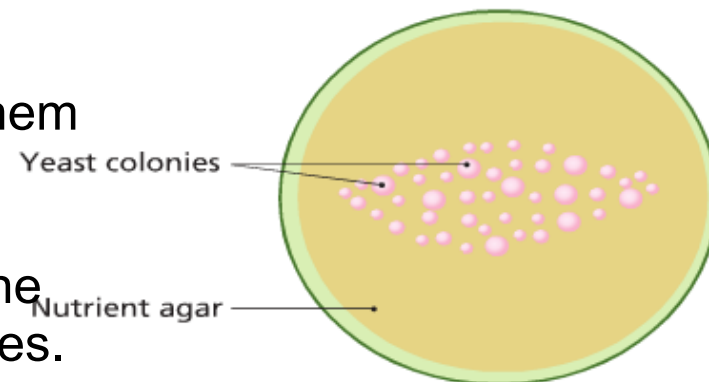
Sterile - means that all micro-organisms are destroyed. i.e. there is nothing living.

Important - to keep the bench sterile we wash our hands, the desk and all equipment with **disinfectant**. We also put the tweezers etc. through a bunsen flame.



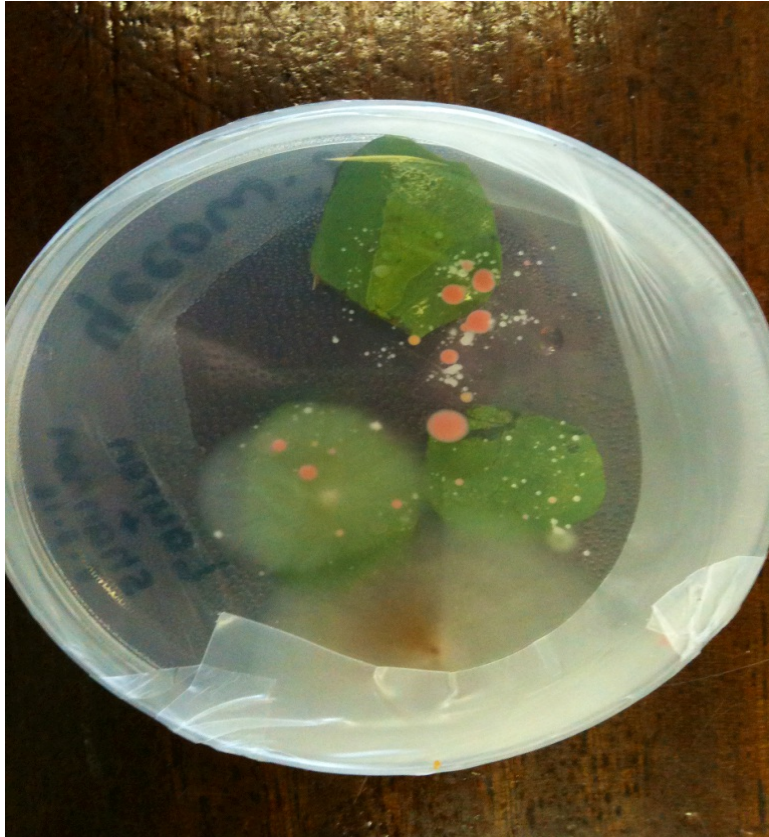
For this experiment we collect **Ash** or **Ivy** leaves. We cut them into circles and stick them face up to the inside of the dish lid.

The yeast spores drop off the leaves onto the agar. They start to grow and form **pink** colonies.



This is **Saccharomyces roseus**.

Results



Economic Importance of Fungi

Benefits

Yeasts are used in alcohol making.
Button/Field mushrooms are grown for food.



Disadvantages

Fungi destroy many materials, e.g.
Food (bread, fruit)
Crops, (potato)
Paper (mildew)
Timber (Dry rot and Wet rot)



Fungal diseases of plants, humans and animals.