

3.1.4 Fungi 1 - *Rhizopus*

Features of Fungi

- They do not make their own food.
- They are mostly multi-cellular.
- They are made up of threads called hyphae.
- Hyphae combine in masses to form a mycelium.
- Their walls are made of a carbohydrate called **chitin**.

Nutrition

All fungi are **heterotrophs**, i.e. they take in food made by other organisms.

Fungi are either: **Saprophytic** or **Parasitic**

Saprophytic fungi

- Most fungi are saprophytic. They obtain nutrients from dead material.
- As they digest it minerals are released and recycled.
- Play a vital role in the environment as they are responsible for decay, e.g. mushrooms and moulds

Parasitic Fungi

- Absorb their food from live hosts.
- They get their food mostly from plants although some fungal parasites live on animals, e.g. athlete's foot.

Types of Parasitic Fungi

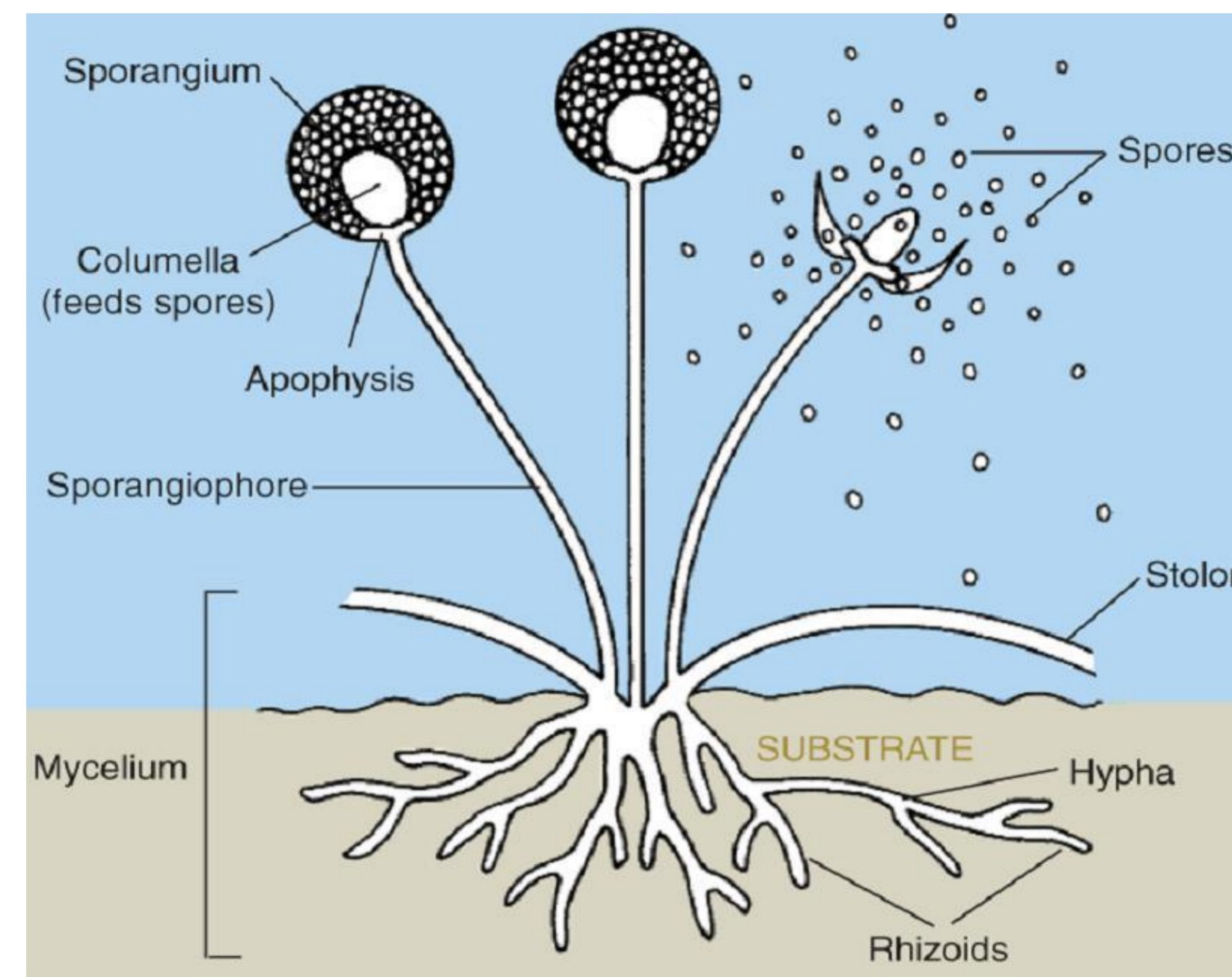
- **Obligate parasites** – live on live hosts but do not normally kill them.
- **Facultative parasites** – kill the host and feed on the remains.
- Some fungi form symbiotic relationships with other organisms.
- A lichen is an organism which is a combination of a fungus and an alga

Edible and poisonous fungi

- Some fungi are edible, but many are poisonous if eaten
- It is often difficult to distinguish between the edible and poisonous varieties growing in the wild

Structure of *Rhizopus*

- Consists of threadlike structures called Hyphae
- They are tubular with no cross walls and are **multinucleate**. Each nucleus is haploid.
- Large numbers of hyphae are called a **mycelium**
- The hyphae digest the substrate on which they grow.
- **Rhizoids** provide extra surface area for absorption of the digested material .
- Stolons are hyphae which allow *Rhizopus* to spread sideways.



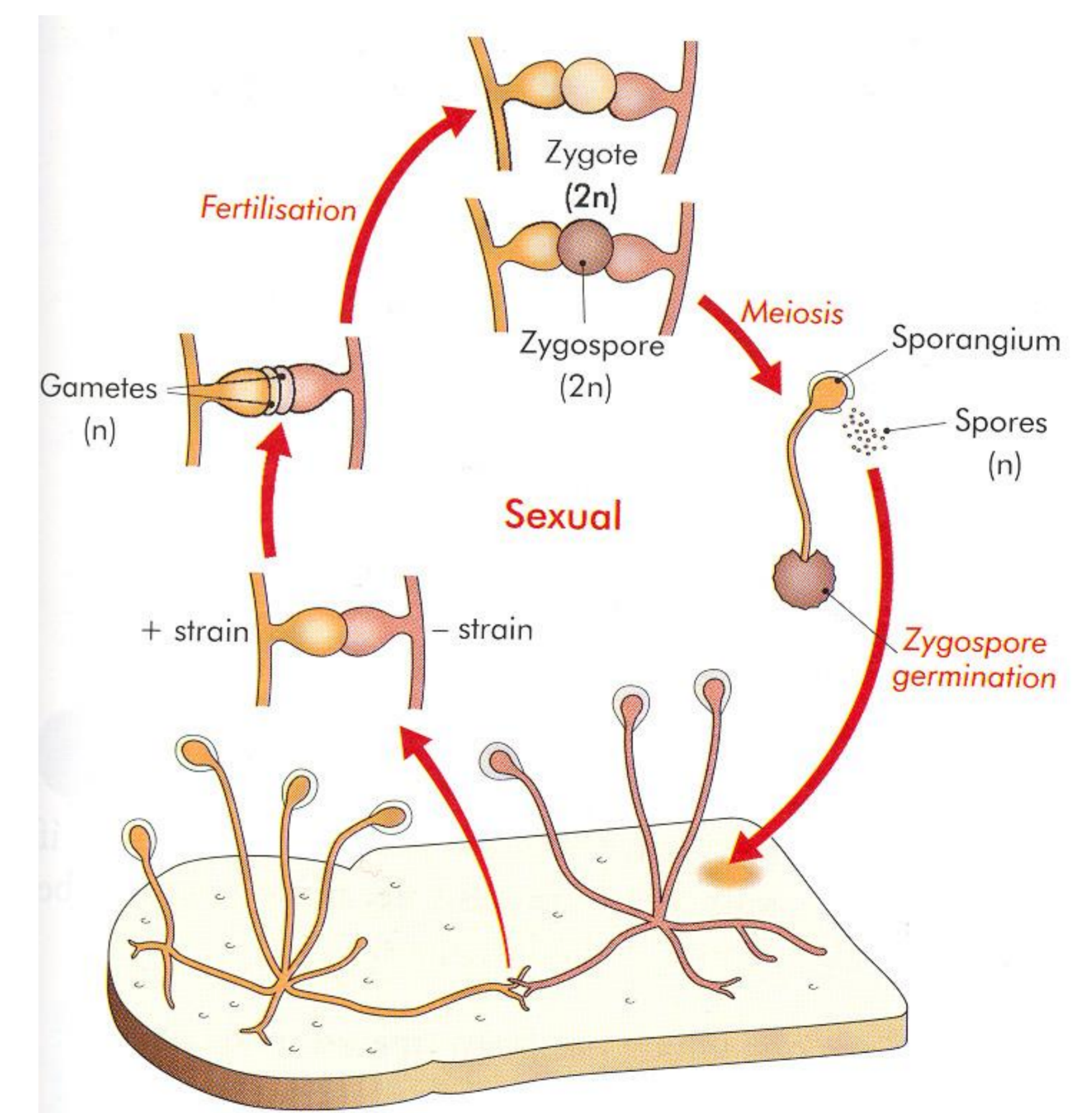
Life cycle of *Rhizopus*

Asexual reproduction

- **Sporangiophores** grow up from the substrate
- Cells within the sporangium divide by mitosis to produce **spores** (haploid)
- The sporangium dries out in the right conditions and opens releasing many spores.
- Each spore will grow into a new hypha and mycelium if it lands on a suitable substrate

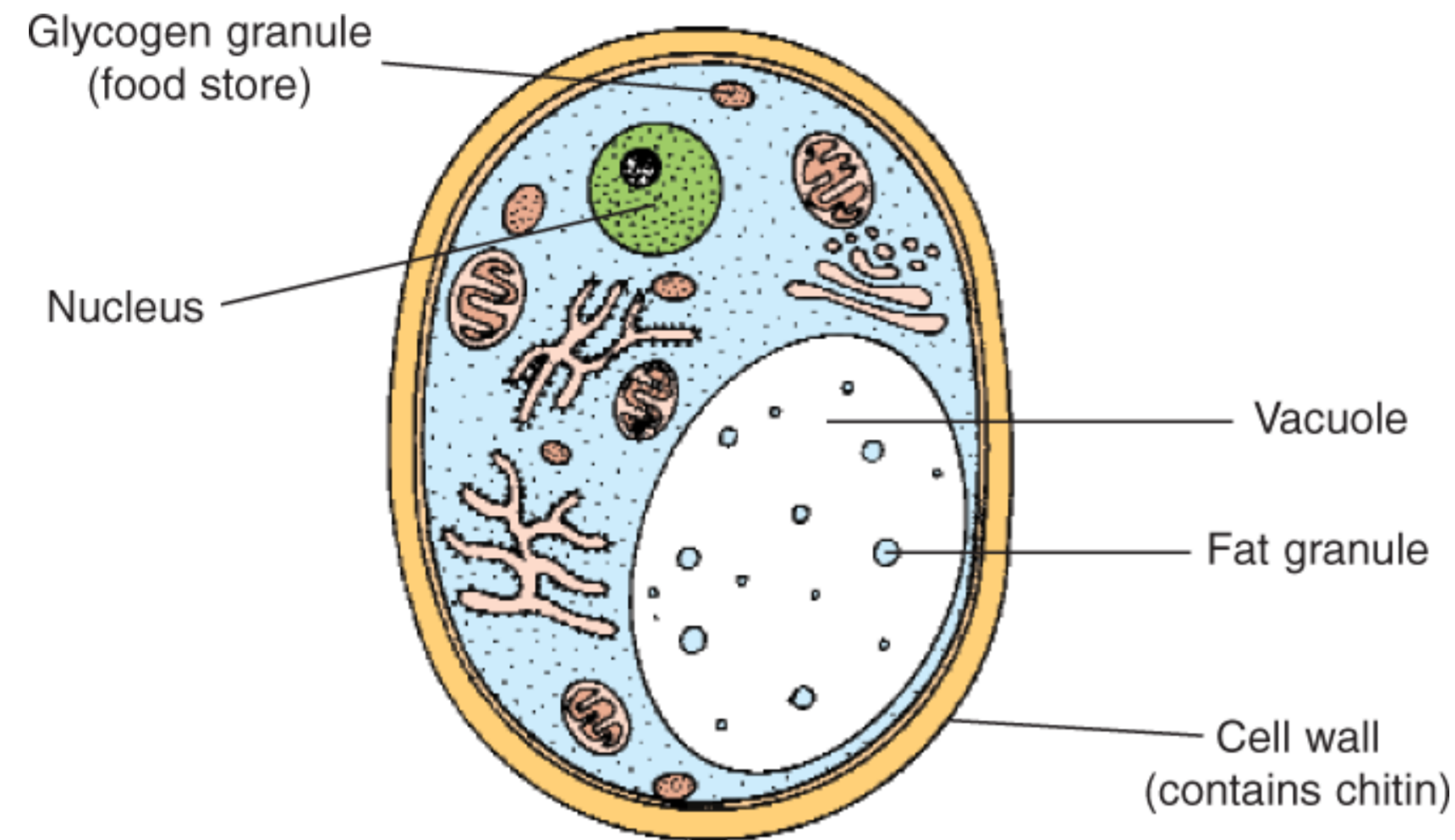
Sexual reproduction

- Sexual reproduction in *Rhizopus* can only occur between a plus and a minus strain
- When hyphae from opposite strains grow close together swellings grow on both strains and touch each other
- Nuclei from both hyphae move into these swellings which are now called progametangia
- Cross-walls form to produce gametangia
- The walls of the gametangia dissolve and a number of fertilisations take place producing diploid zygote nuclei
- A zygospore forms around these nuclei
- When conditions are suitable the zygospore germinates by meiosis
- A hypha grows out of the zygospore and produces a sporangium at the tip
- The sporangium opens releasing many haploid spores which grow into new individuals

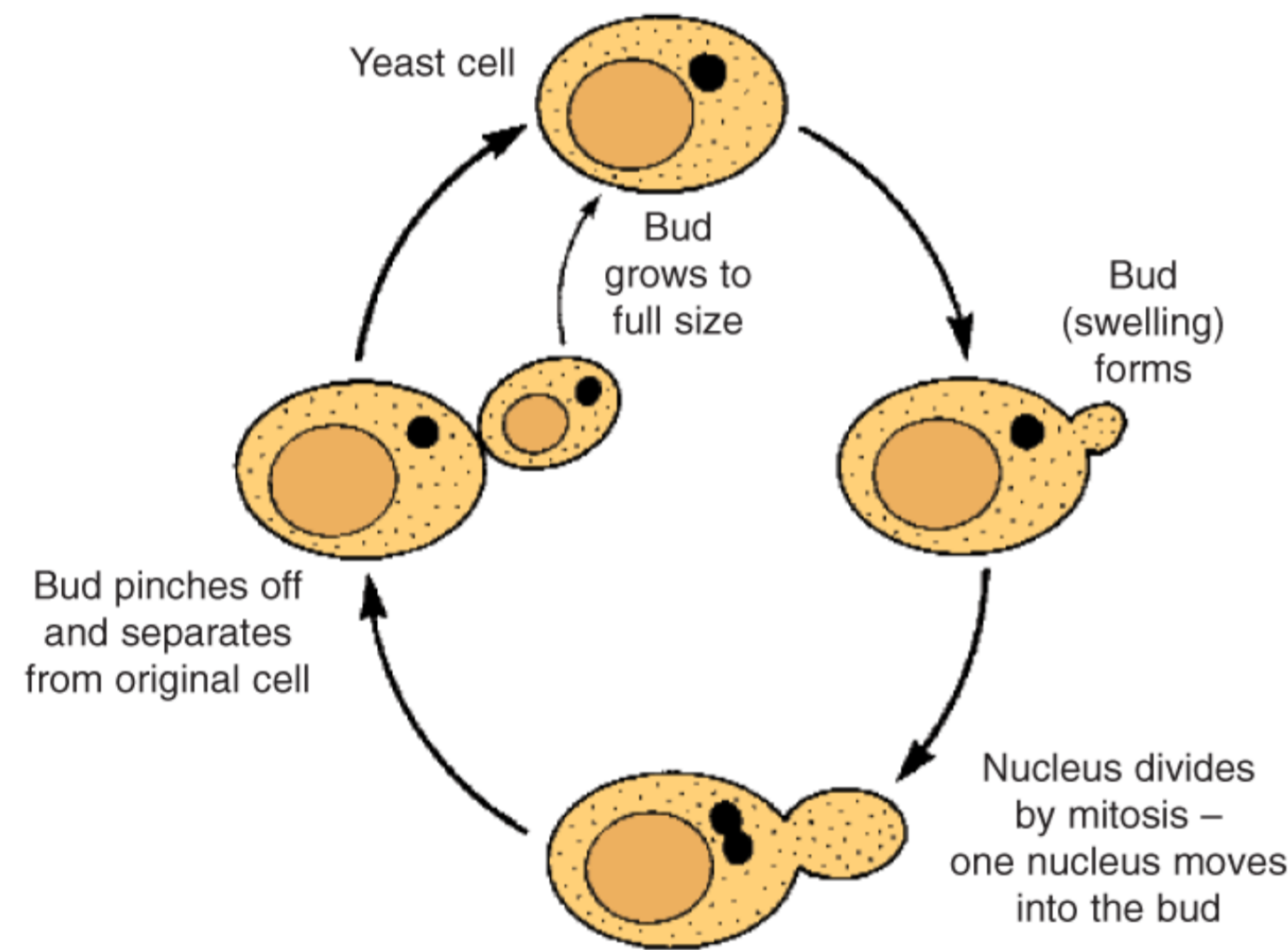


3.1.4 Fungi 2 – Yeast and *Rhizopus*

Structure of yeast



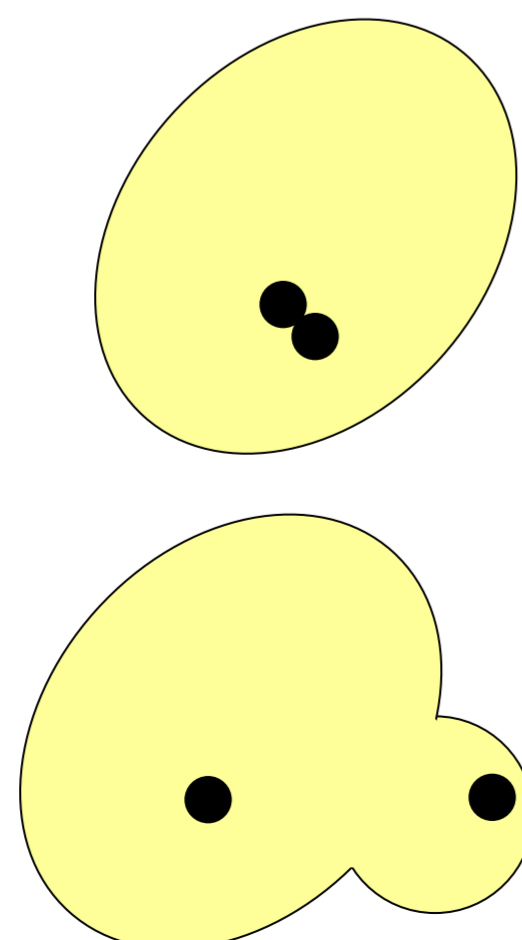
Reproduction in Yeast



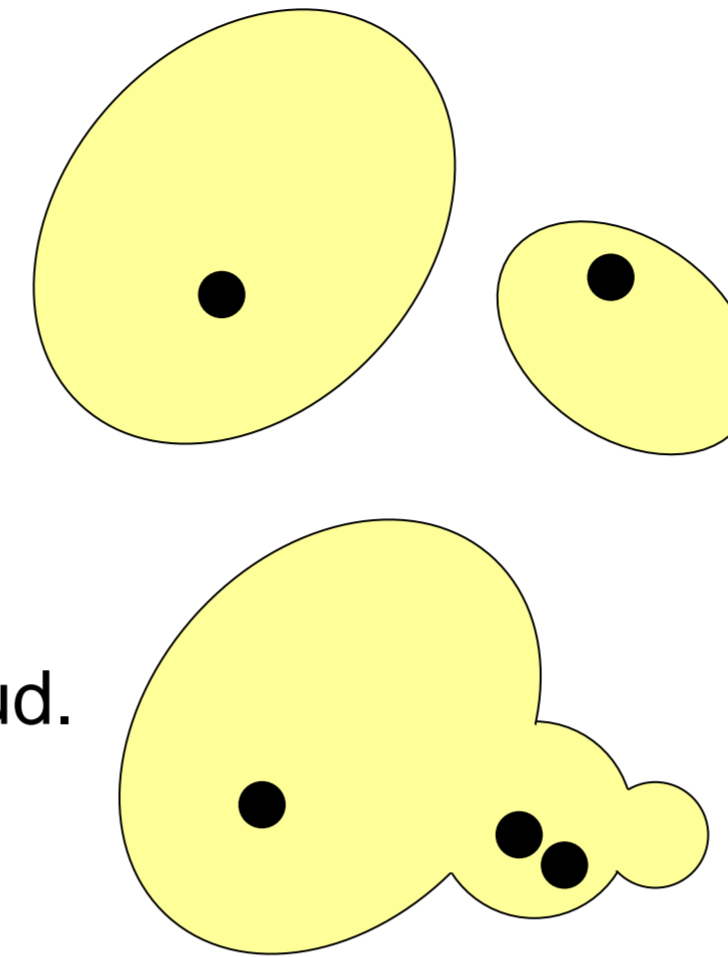
Asexual reproduction – budding

The nucleus of the parent cell divides by mitosis.

One of the daughter nuclei enters a small developing bud on the outside of the yeast cell.



This bud can separate from the parent to become a new individual.

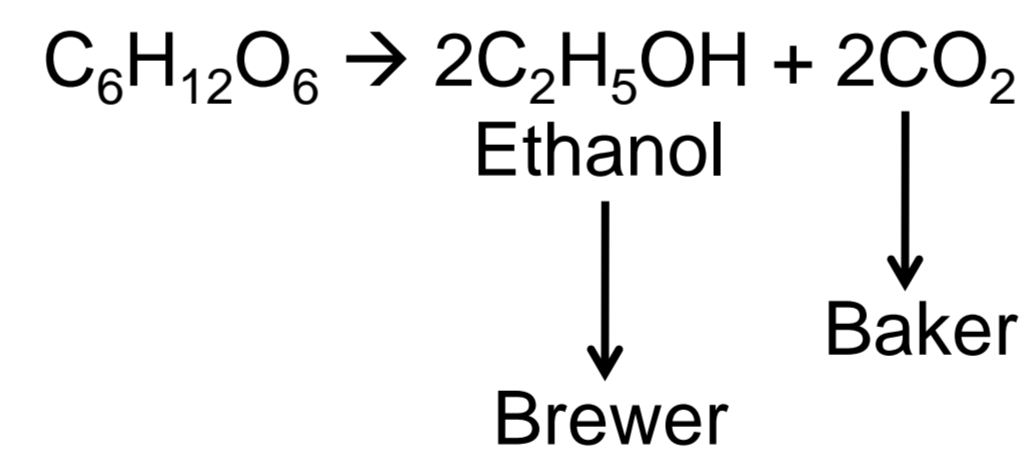


In some cases the bud does not separate, but can itself bud. In this way long colonies of yeast cells can develop.

Economic importance of fungi

Beneficial fungi

- Fungi can be used as a source of food, e.g. Mushroom
- Yeasts can be used to make bread and alcohols such as wine and beer – anaerobic respiration

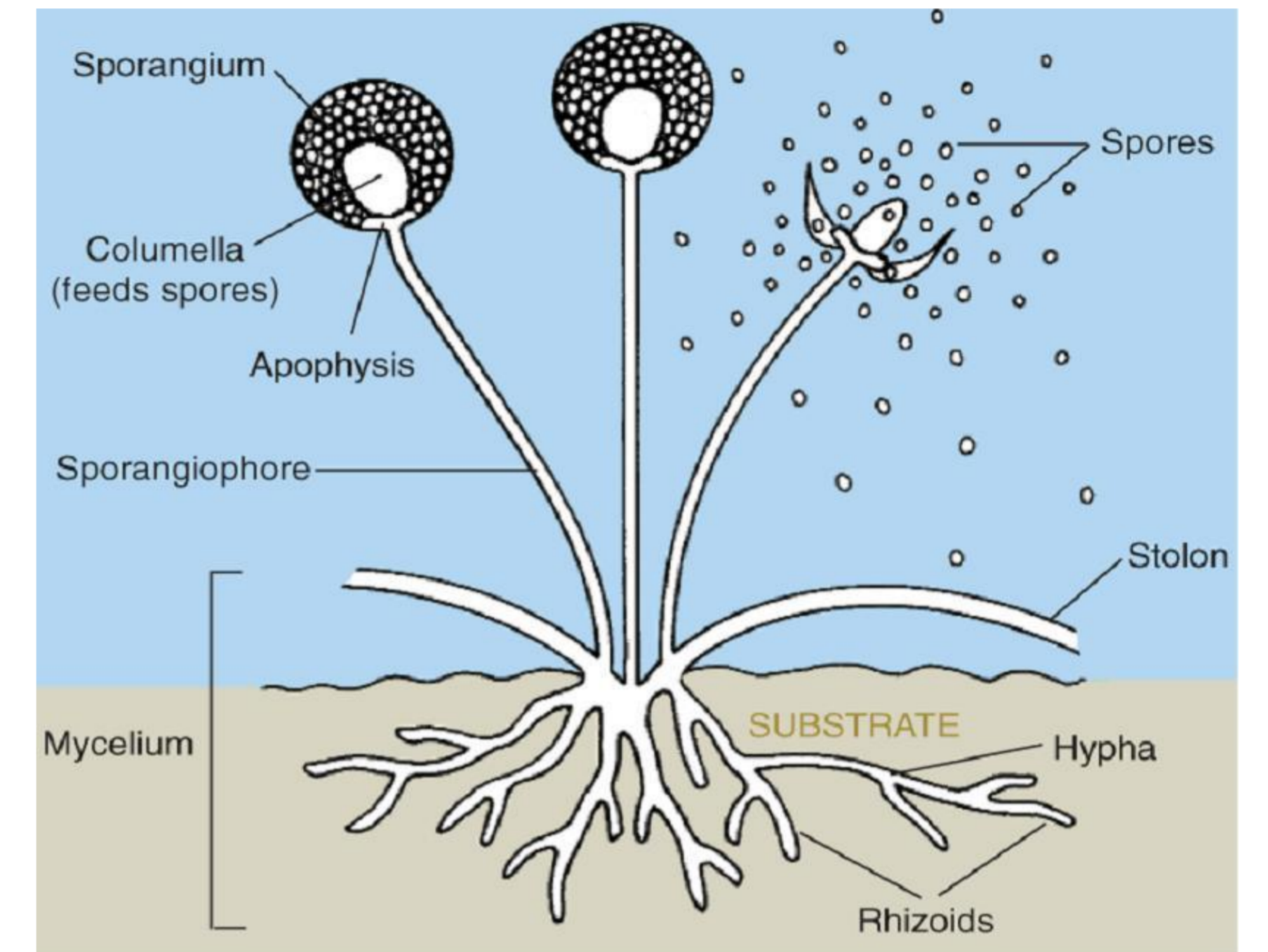


Note: the CO₂ produced by yeast causes the dough to rise - the heat evaporates the ethanol

Harmful fungi

- Fungi (parasitic) can attack crops, e.g. corn and wheat and cause major financial losses as a result
- Fungi (parasitic) such as athlete's foot and ringworm can infect animals
- Fungi (saprophytic) can spoil food, e.g. *Rhizopus* grows on bread

Structure of Rhizopus



Sexual reproduction in Rhizopus

