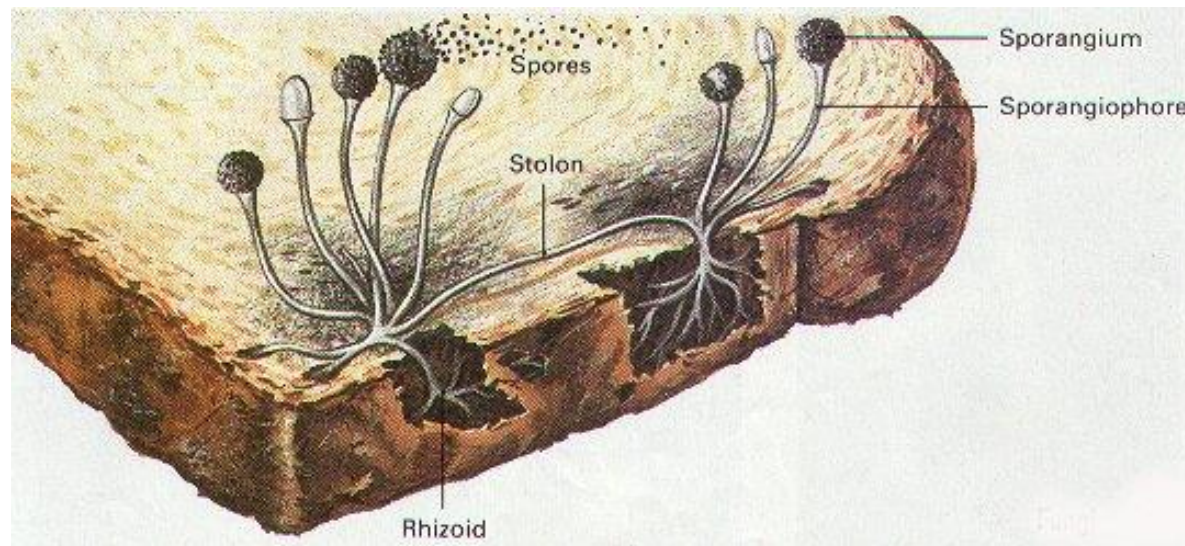
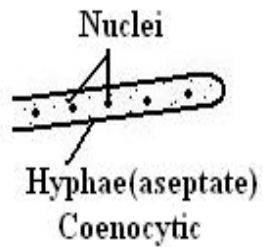
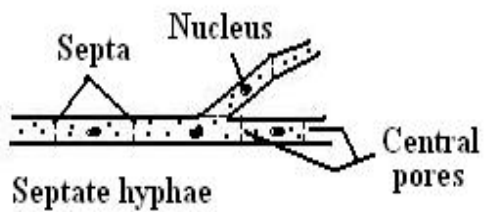
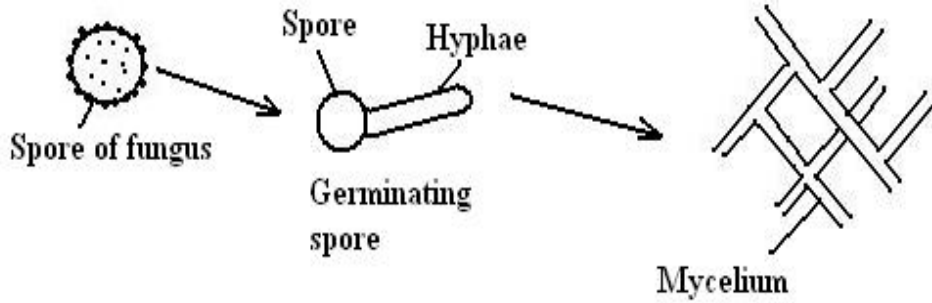


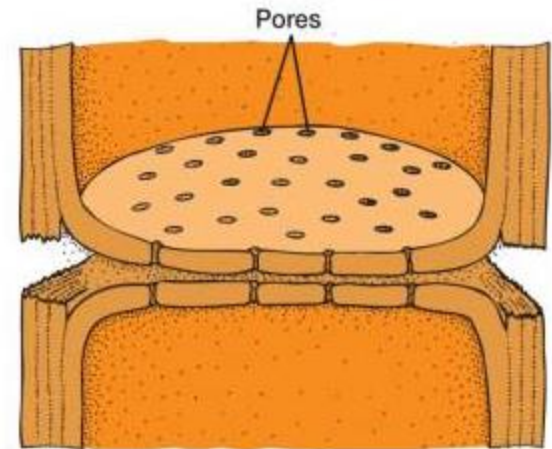
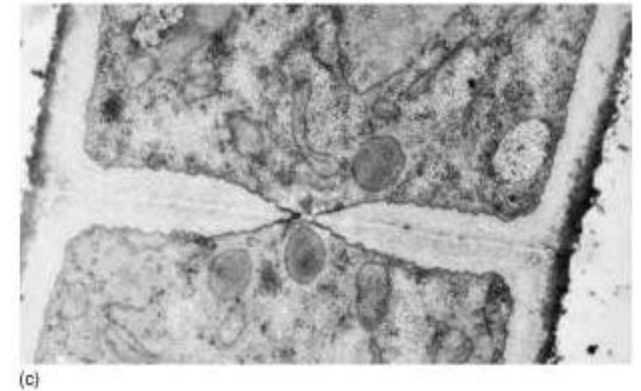
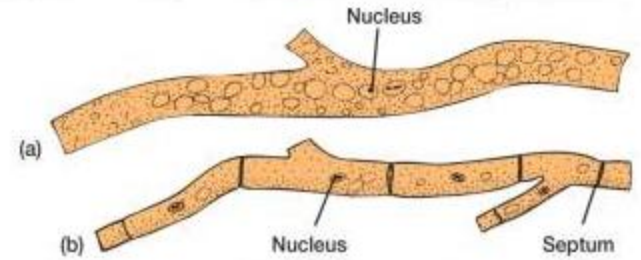
Fungi

- Fungi are eukaryotic, spore-bearing organisms with absorptive nutrition.
- unicellular fungus - yeast
- vegetative structure of a fungus is called **Thallus**
- fungal cell is encased in a cell wall made of chitin
- long, branched filaments called the hyphae, aggregate to form mycelium





Thallus organisation (structure)

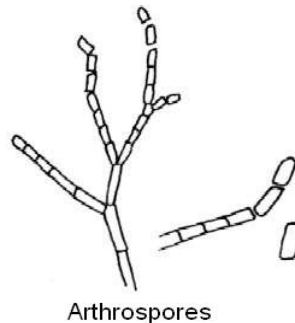


Nutrition

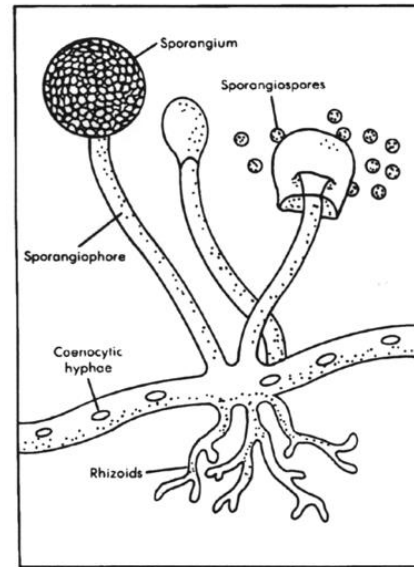
- Fungi grow best in dark, moist habitats
- classified as **parasites and saprophytes**
- Obligate saprophytes
- Facultative parasites or saprophytes
- Obligate parasites
- They are chemo-organoheterotrophs
- Fungi are usually aerobic
- Some yeasts facultatively anaerobic

Reproduction in Fungi

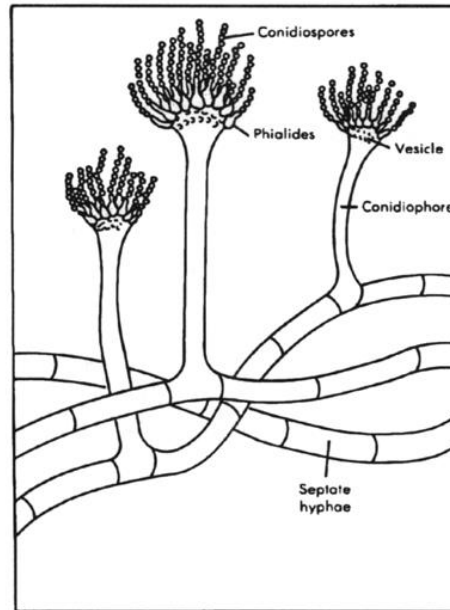
- Fungi reproduce either sexually or asexually
- **Asexual** reproduction
- A parent cell can divide into two daughter cells
- Somatic vegetative cells may bud to produce new organisms
- By the production of asexual spores
- **Arthrospores**
- **Chlamydospores**

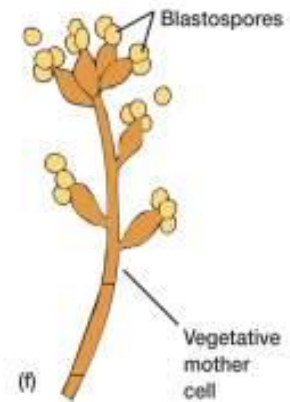
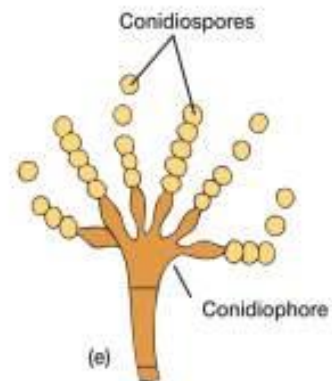
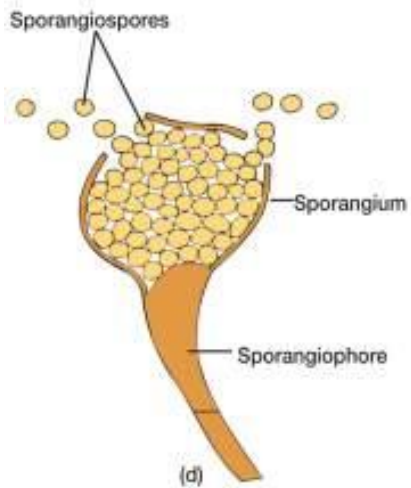
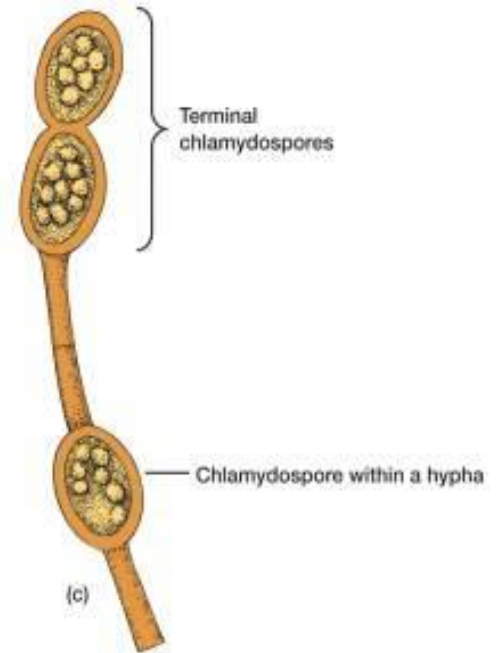
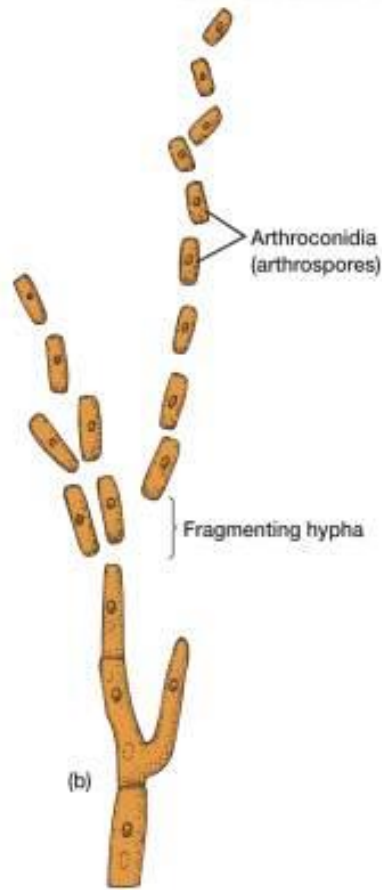
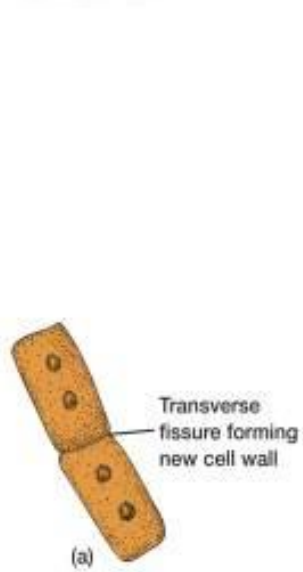


- **Sporangiospores**



- **Conidiospores**
- **Blastospores**





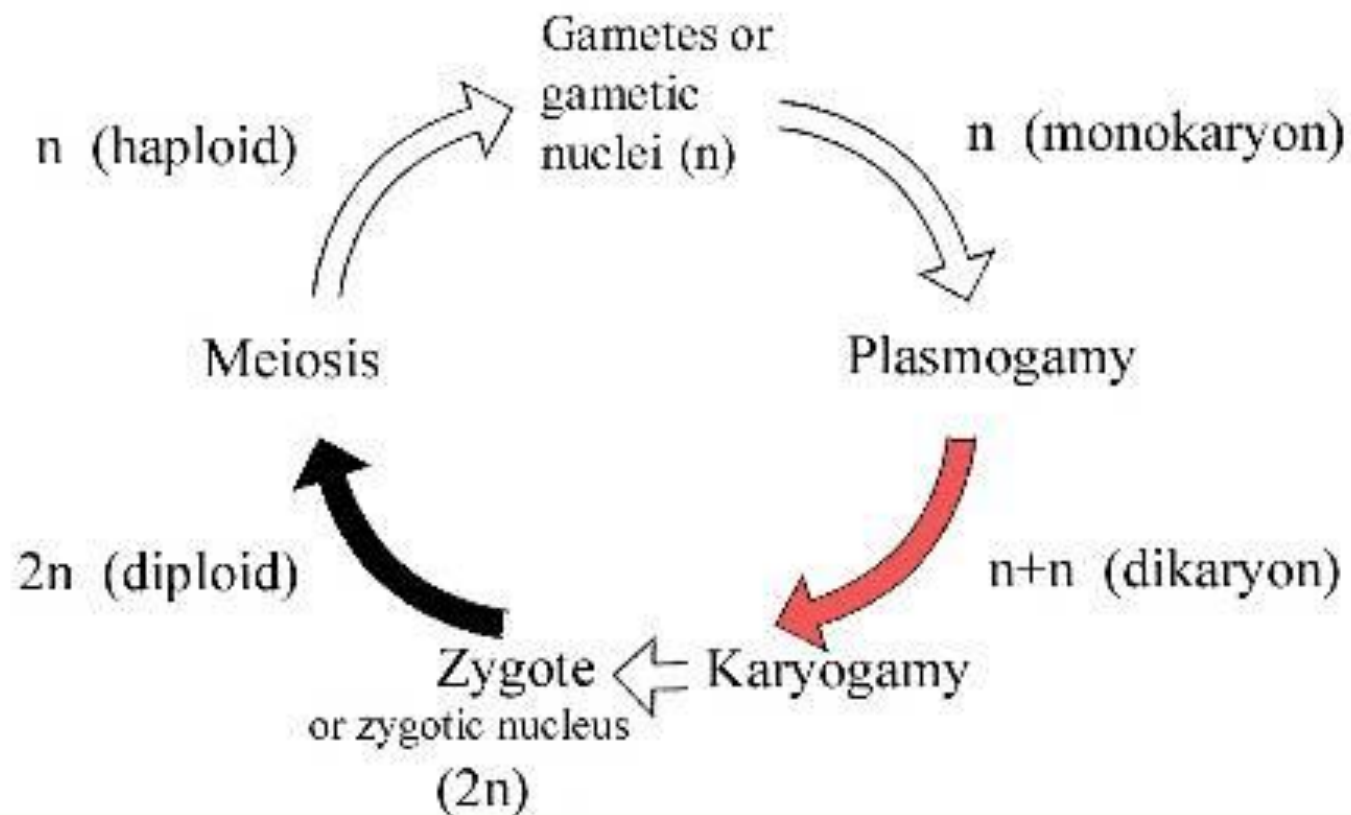
Sexual Reproduction

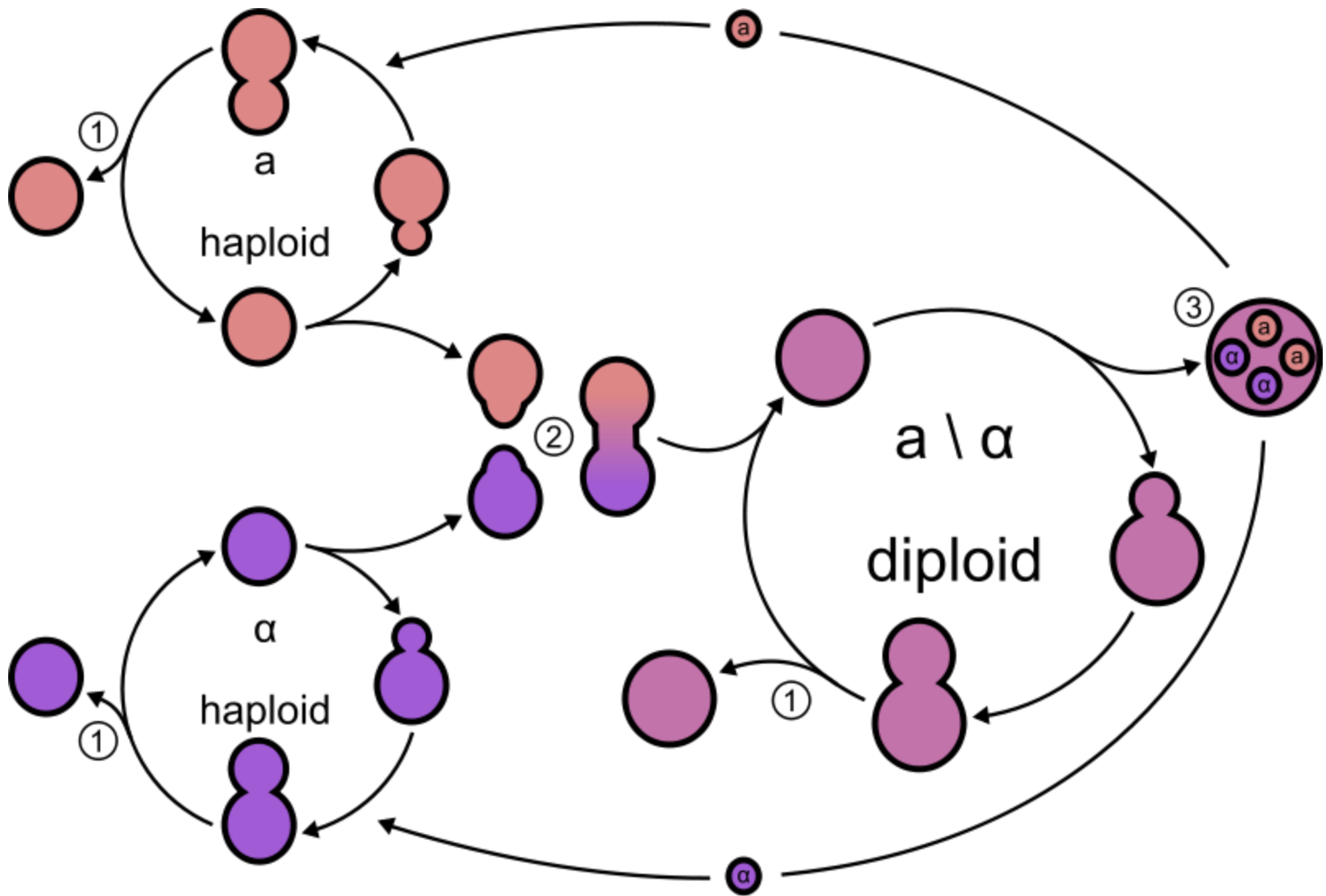
- Sexual reproduction involves the union of compatible nuclei
- sexual fusion may occur between haploid gametes or haphae

Taxonomic classification of fungi

Division	Common Name	Approx. No. of species
Zygomycota	Zygomycetes	600
Ascomycota	Sac fungi	35,000
Basidiomycota	Club fungi	30,000
Deuteromycota	Fungi imperfecti	30,000

Generalized Nuclear Cycle of Fungi



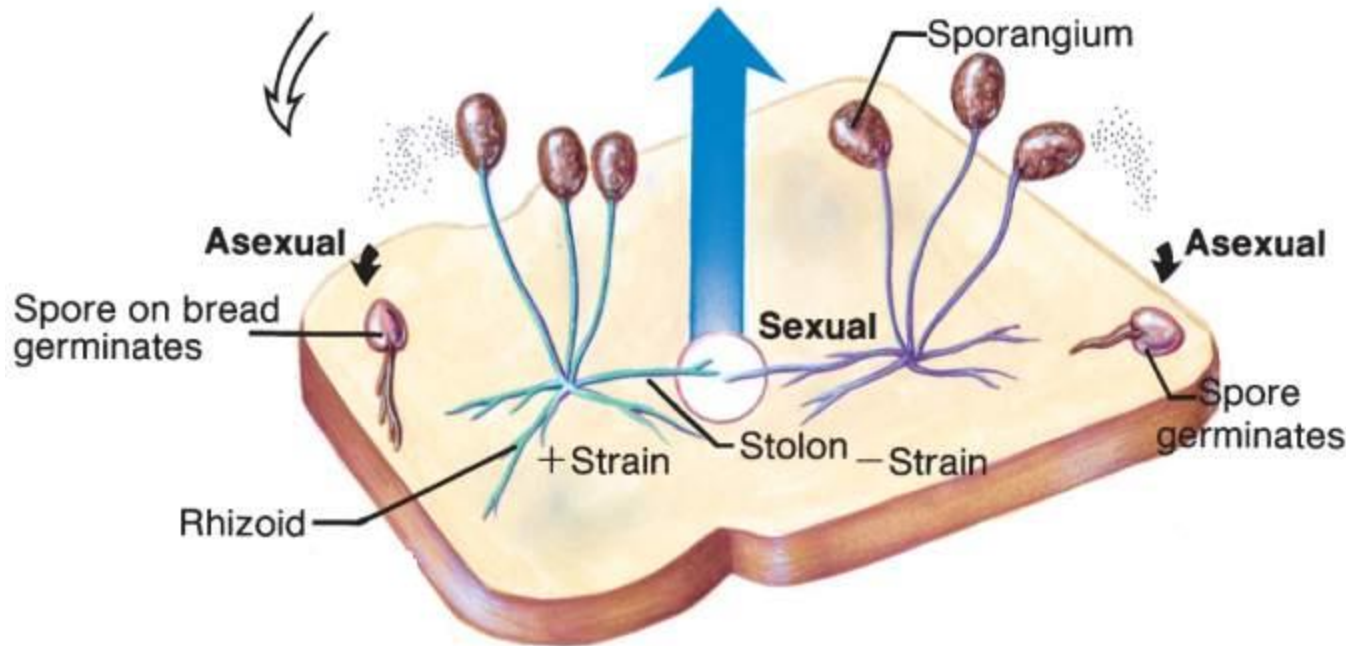
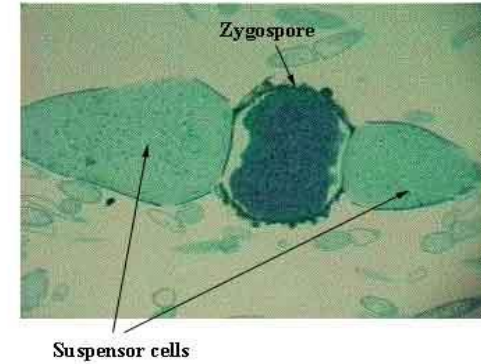
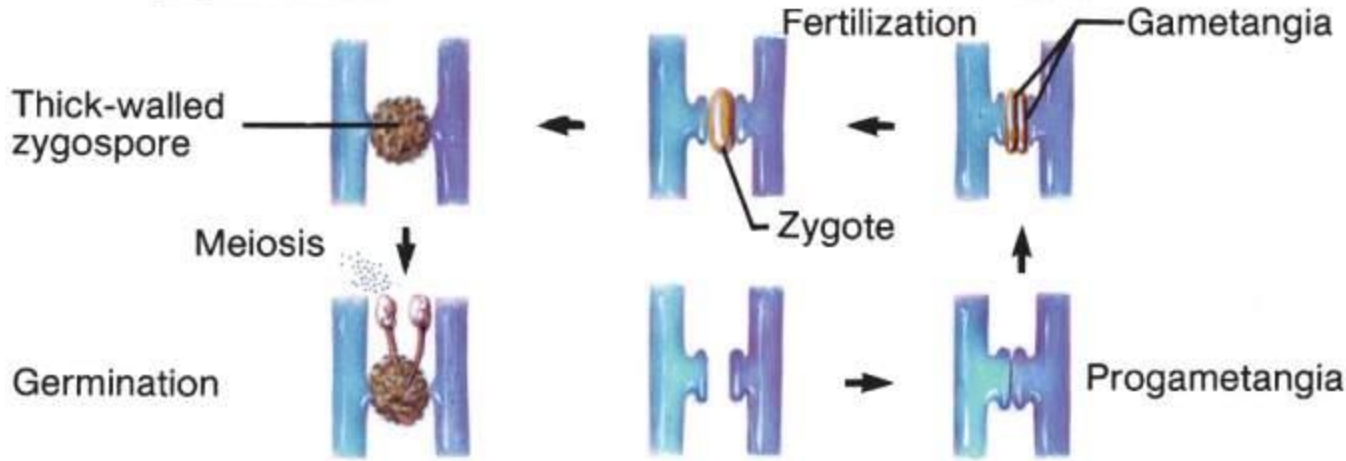


Division Zygomycota

- zygomycetes are coenocytic. Most are saprophytic. A few are parasites
- Eg. *Rhizopus stolonifer*, the bread mold
- Special hyphae called rhizoids extend into the substrate and absorb nutrients
- Some hyphae produce asexual sporangia
- when released can start a new mycelium
- *Rhizopus* usually reproduces asexually, if food becomes scarce, begins sexual reproduction

Rhizopus sp.

Sexual reproduction in a Zygomycetes



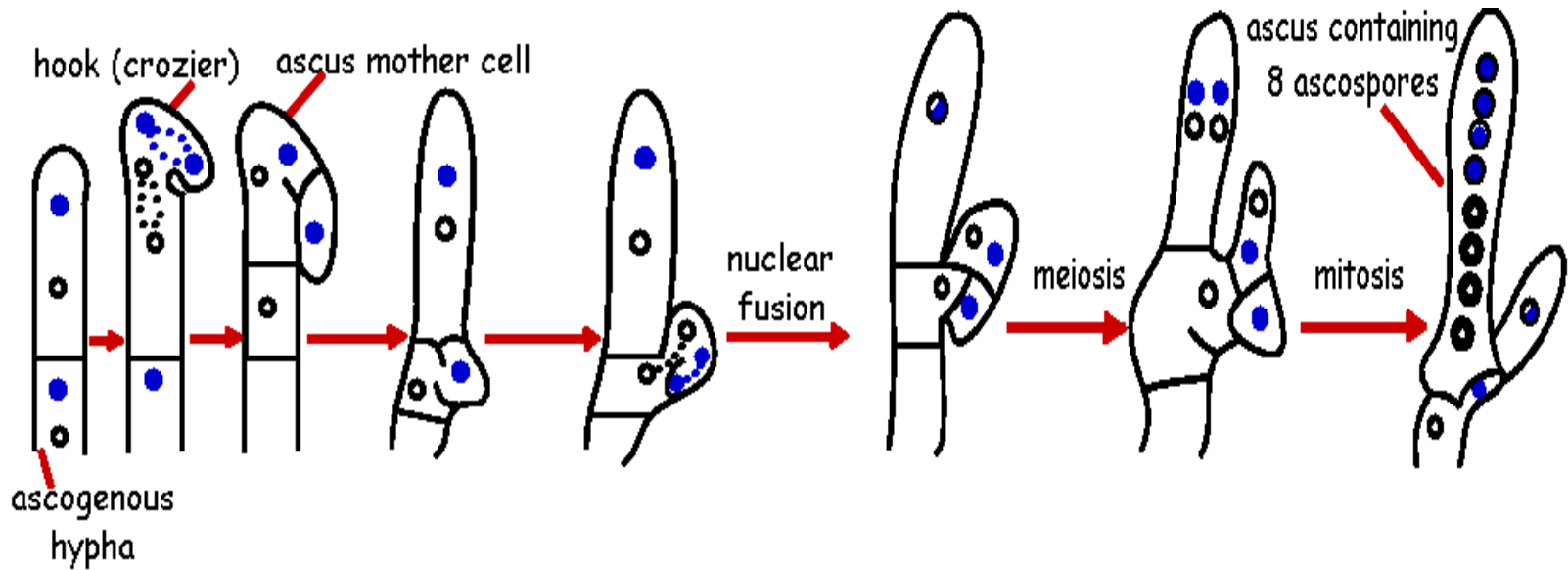
- When two mating strains come close, hyphae form projections **progametangia** mature to **gametangia**
- **Zygote**
- **Zygospore**
- Zygospore asexual sporangium and the cycle begins

Division Ascomycota

- Fungi of this division are called ascomycetes or sac fungi
- Many ascomycetes are parasites of higher plants. *Ergotism, Claviceps purpurea*
- Mycelium of ascomycetes is composed of septate hyphae
- Asexual reproduction is common - conidiospores
- Sexual reproduction involves the formation of an ascus containing ascospores
- Sexual reproduction special ascogenous hyphae

- Antheridium, ascogonium, migrate to form the ascogenous hyphae
- The paired nuclei divide that there is one pair of nuclei in each cell
- nuclear fusion occurs at the hyphal tips in the ascus mother cells
- diploid zygote nucleus undergoes meiosis, resulting in four haploid nuclei
- These divide mitotically to produce a row of eight nuclei in each developing ascus

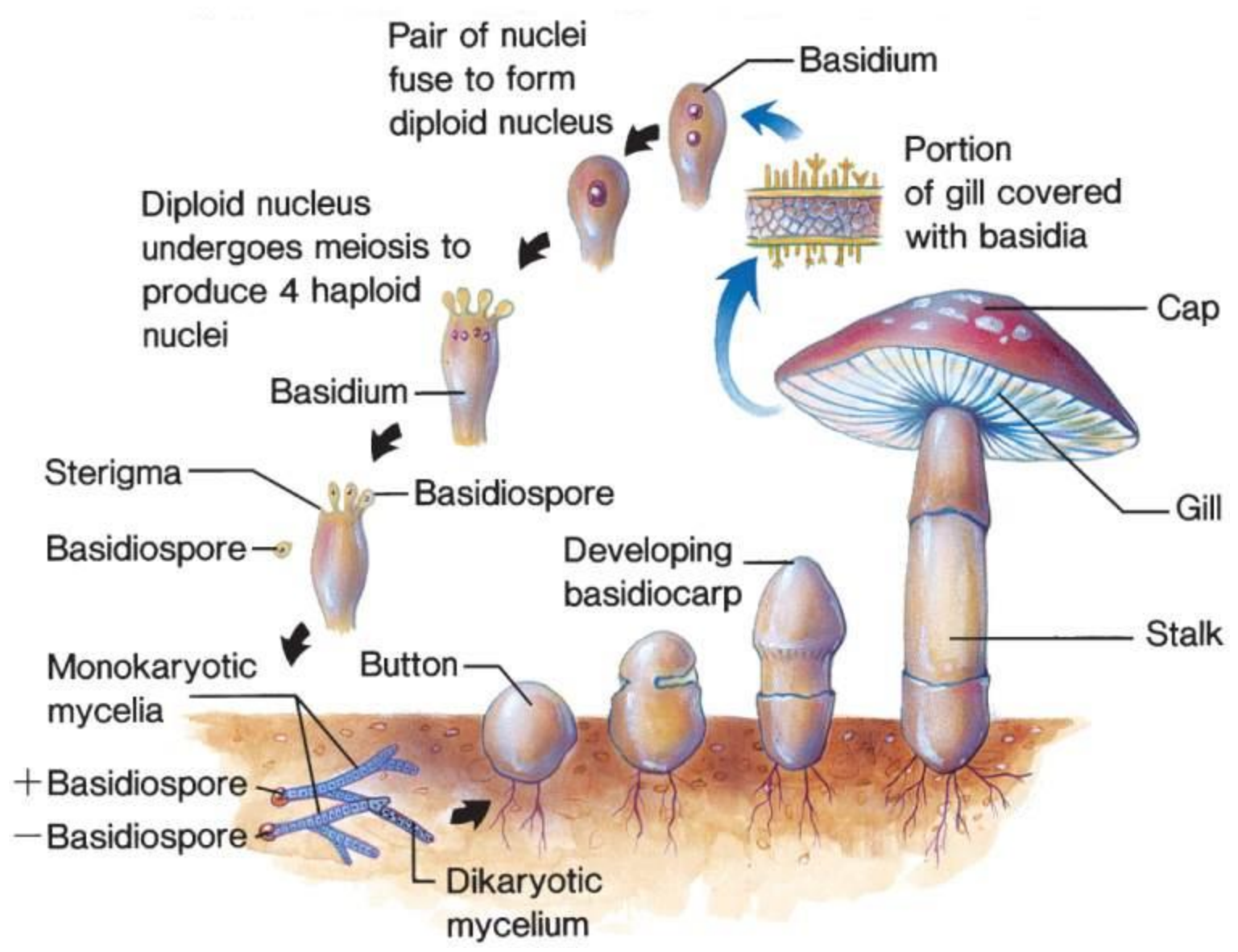
Ascospores



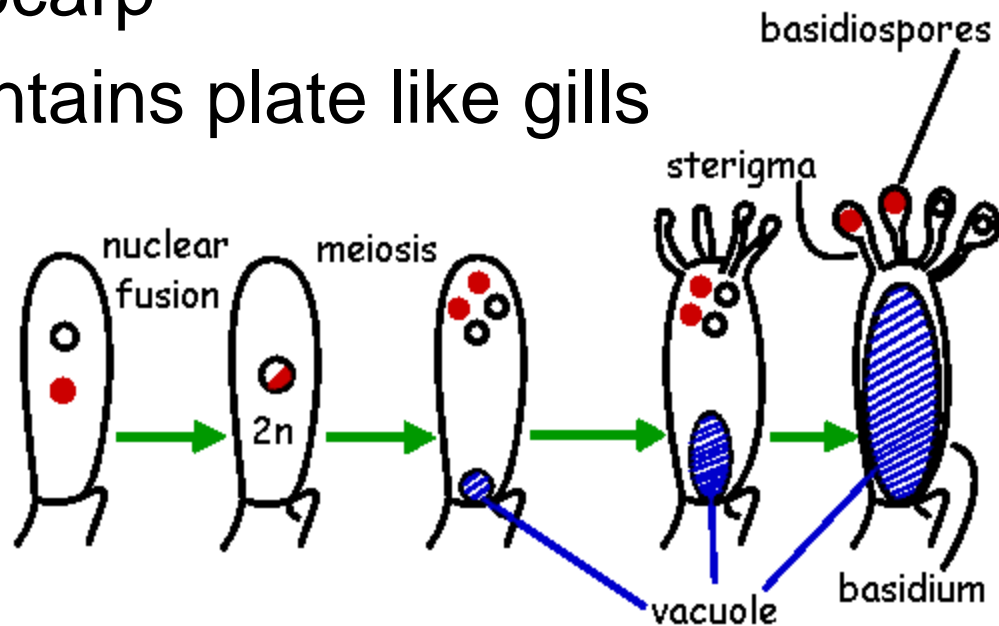
Source: fungionline.org.uk

Division: Basidiomycota

- Basidiomycetes are commonly called club fungi, mushrooms etc,
- the **basidium**, involved in sexual reproduction
- Most are saprophytic and decompose plant debris, especially cellulose and lignin
- Many mushrooms specific alkaloids either as poisons or hallucinogens
- The life cycle of a typical basidiomycete starts with a basidiospore germinating to produce a monokaryotic mycelium
- meets another monokaryotic, mycelium of a different making type, mycelia fuse to dikaryotic secondary mycelium



- This mycelium is stimulated to produce a solid mass of hyphae, as a button that pushes through the soil, elongates and develops a cap
- Basidiocarp
- cap contains plate like gills



Division Deuteromycota

- When a fungus lacks the sexual phase, it is placed in the division Deuteromycota, **Fungi Imperfeci**
- few are parasitic on other fungi
- Several human pathogenic forms like athlete's foot, ringworm etc., belong to these group

Slime molds and water molds

- These molds resemble fungi in appearance
- In their cellular organization, they are related most closely to the protists

Economic importance of fungi

- Fungi are both useful as well as harmful to humankind
- **Useful activities of fungi**
 - Food Industry
 - Mushrooms are a type of fungi - Edible
 - *Agaricus bisporous*
 - *Lecanora esculata* is a lichen
 - Reindeer moss – a lichen in tundra
 - Food yeast contains vitamins of the B-group, E-group and 15% proteins, (used as SCP)

Industrial applications

- In breweries :
 - Anaerobic respiration (fermentation) of glucose - yeasts yield ethyl alcohol and CO₂
- In bakeries :
 - *Saccharomyces cerevisiae* - baker's yeast.
- Cheese processing :
 - *Penicillium* and *Aspergillus*
- Chemical industry :
 - citric acid, gallic acid, gluconic acid, *Aspergillus* sp.
- Others :
 - perfumes are obtained from lichens
- Role in agriculture:
 - Saprophytic fungi help in the decay of dead animals and plants
- Recycling and mineralization of materials

- **Medical uses**

- **Anibiotics**

- **Patulia**
 - **Fumigati**
 - **Cephalosporin**
 - **Viridin**

- **Synthesis of vitamins and enzymes**

- **Synthesis of proteins and fats**

Harmful activities of fungi

- **Human diseases**
- **Plant diseases**
- **Food spoilage**
- **Tropical deterioration**

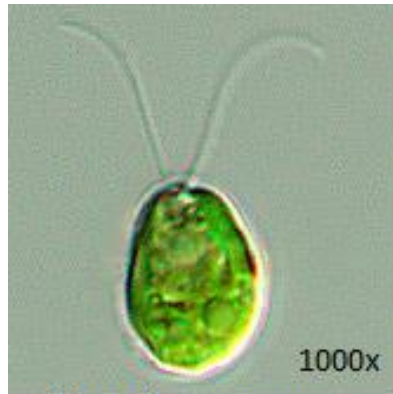
Algae

- Algae are classified under the group thallophyta in the division cryptogams
- they lack tissues
- Algae are autotrophic oxygenic photosynthesis, freshwater seawater, moist soil
- single celled, colonial or filamentous
- Algae are usually green
- may be blue – green or red or brown
- cell wall is made up of cellulose reserve food as starch

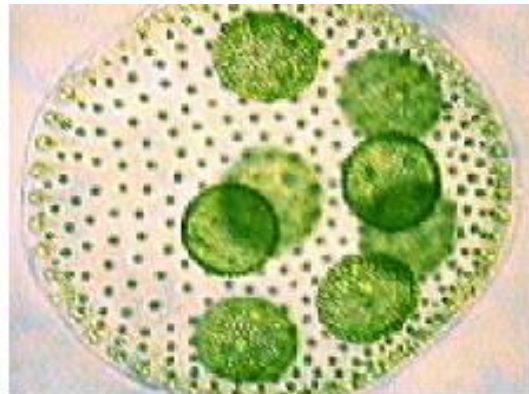
Properties of major groups of algae

Groups	Morphology	Pigments / carbon reserve / cell wall features	Habitats	Examples
Chlorophyta (Green algae)	Unicellular to leafy	Chlorophylls a&b; starch; cell walls of cellulose	Freshwater, soil and marine	<i>Chlamydomonas</i>
Chrysophyta Golden-brown algae, diatoms	Unicellular	Chlorophylls a, c and e; Lipids; silica	Freshwater, soil and marine	<i>Navicula</i>
Phaeophyta (Brown algae)	Filamentous to leafy	Chlorophylls a & c Xanthophylls; Laminarin, mannitol; cellulose	Marine	<i>Laminaria</i>
Pyrrophyta (Dinoflagellates)	Unicellular flagellated	Chlorophylls a&c; starch; cellulose	Freshwater, marine	<i>Gonyaulux</i>
Rhodophyta (Red algae)	Unicellular, filamentous to leafy	Chlorophylls a&d, phycocyanin, phycoerythrin; starch; floridoside, cellulose	Marine	<i>Polysiphonia</i>

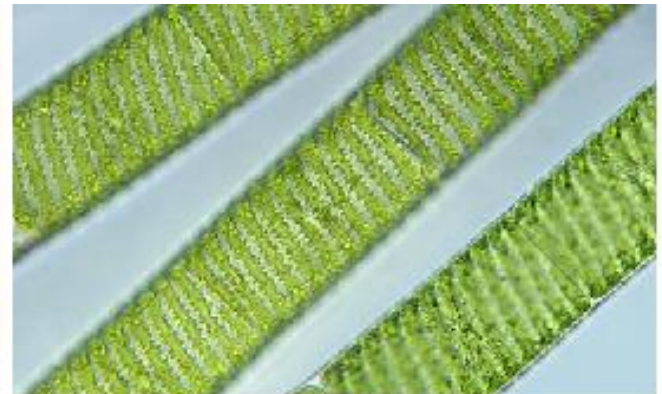
Different groups of algae



Chlamydomonas sp



Volvox sp - Colonial



Spirogyra sp - Filamentous

Protozoa

- Protozoa are unicellular or colonial eukaryotes
- cell wall is absent
- various membrane bound cell organelles
- may be pseudopodia (as in *Amoeba*) cilia (*Paramecium*) or flagella (*Euglena*)
- Parasitic forms do not possess any of these locomotory structures
- Nutrition may be holophytic or holozoic
- autotrophic, heterotrophic or myxotrophic
- Cyst formation is common

Major groups of protozoa

Group	Habitats	Common diseases	Examples
Mastigophora (Flagellates)	Freshwater; parasites of animals	Sleeping sickness Leishmaniasis	<i>Trypanosoma</i> <i>Leishmania</i>
Sarcodina (Amoebas)	Freshwater and marine; animal parasites	Amoebic dysentery	<i>Entamoeba</i>
Ciliophora (Ciliates)	Freshwater and marine; animal parasites	Dysentery	<i>Paramecium</i>
Sporozoa (Sporozoans)	Primarily animal parasites	Malaria	<i>Plasmodium</i>
Euglenoids (Phototrophic flagellates)	Freshwater, some marine (Also considered with algae)	---	<i>Euglena</i>

Protozoa

