Course: B.Sc Botany

Semester: II

Paper: Mycology and Phytopathalogy (BOT CC 203)

Fungi: structure & classification

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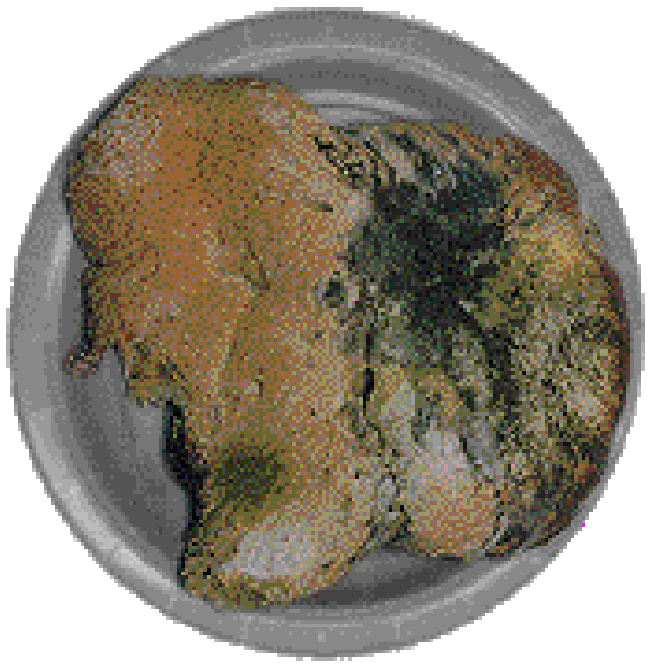
Fungi: structure & classification

The next few slides show some examples of common fungi...

Mushroom

Shelf Fungus



Bread mold

Mold on fruit

mmm…

Characteristics of all Fungi

- **Eukaryotic**
- Most are **multicellular** & **filamentous**
- A few are single celled, **unicellular** (yeasts)
- Heterotrophic – do not make their own food
  - Absorb nutrients through the cell wall
- Do not move

- Mushrooms help digest dead, decaying matter.

There are two phases in the life cycle of a fungi

1) **Vegetative phase** :The thallus in vegetative unicellular or multicellular , filamentous, **septate** or **aseptate**

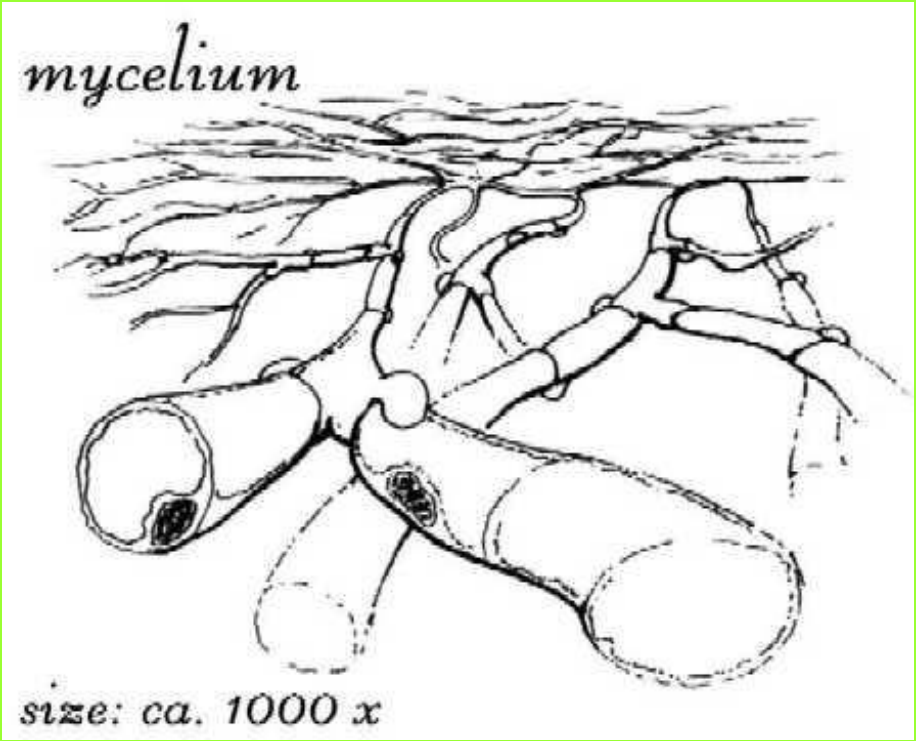
2) **Reproductive phase** : represented by various types of fruiting body formed by germination of spores

Structure of Fungi

- Each cell has a cell wall made of **chitin**
- The multicellular fungi has the thallus (fungal body) made of **Mycelium** (mass of hyphae)
- **Hyphae** are hair-like filamentous chains of cells.

- Fungi come in many sizes, shapes, and colors.

Structure...



Mycelium: Mass of tangled filaments

Hypha: One individual filament

Hyphae (plural, pronounced “hy-fee”) are divided up by cross walls containing one or more nuclei.

Hyphae

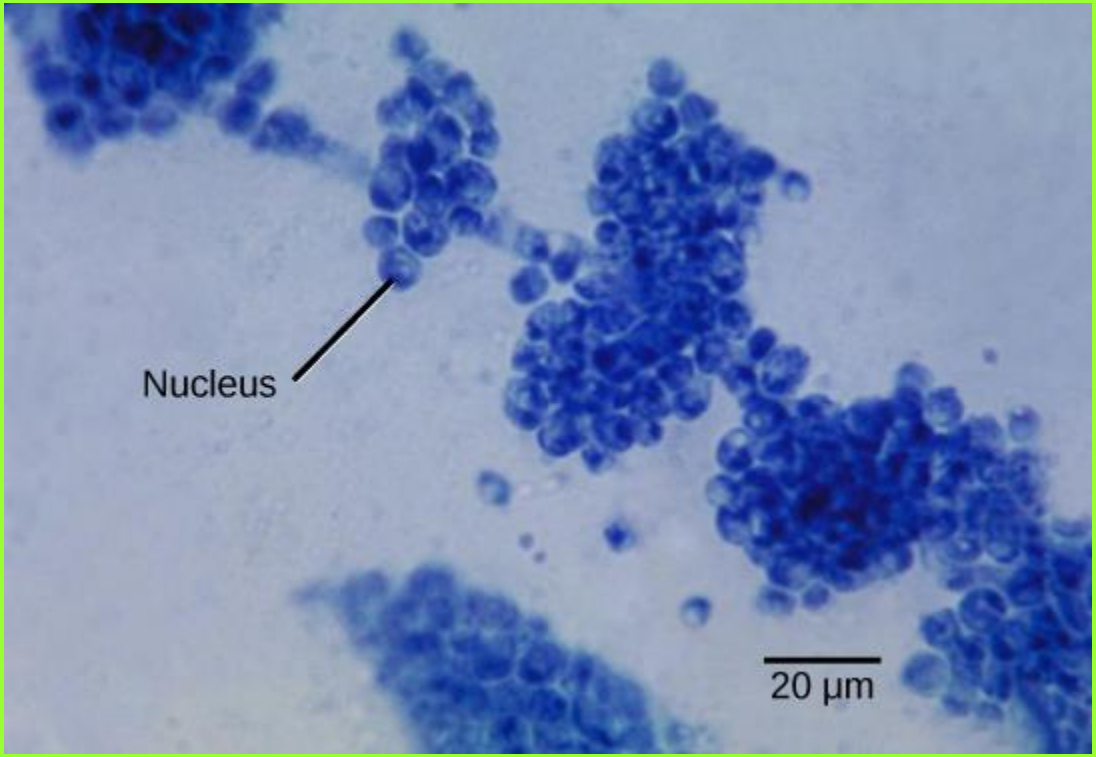
- Tubular
- Hard wall of chitin
- Crosswalls may form compartments (± cells)
- Multinucleate
- Grow at tips

Thallus struture

Unicellular forms may be motile or non-motile.

- Thallus is more or less spherical single celled
- It consists of a naked mass of multinucleate, amoeboid protoplasm
- *Saccharomyces cerevisiae* (baker's yeast) and *Candida* species (the agents of thrush, a common fungal infection) are examples of unicellular fungi

Example of a unicellular fungus: *Candida* spp



Multicellular thallus:

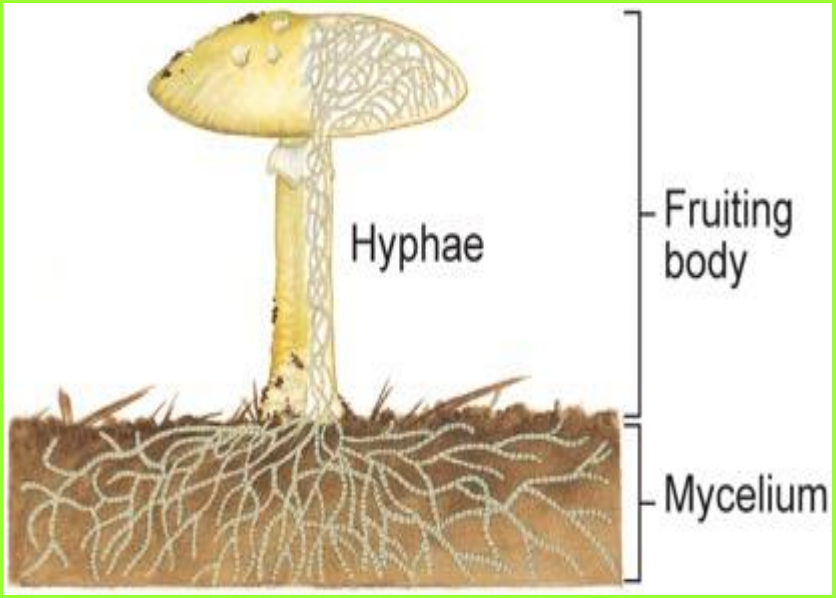
- Filamentous, uninucleate, septate and branched

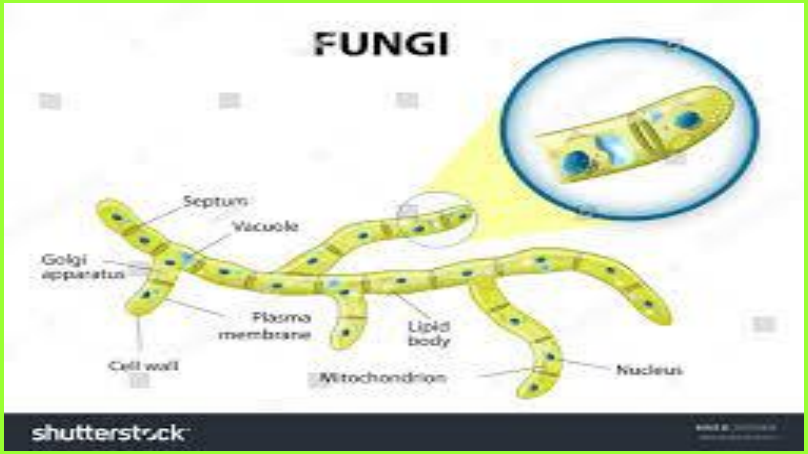
- They display two distinct morphological stages: the vegetative and reproductive.

- The vegetative stage consists of a tangle of slender thread-like structures called hyphae (singular, hypha),

- The reproductive stage can be more conspicuous. The mass of hyphae is a mycelium.

Example of a multicellular fungi





The structure of a fungal hyphae

- Strong, rigid **cell wall** encloses the protoplast.
- Cell wall contains chitin, permeable to water.

The **protoplast** differentiated in:

- **Plasma membrane** or cell membrane: delicate, thin walled and living
- **Cytoplasm**: vacuolated, one or more than one nuclei, cell organells and inclusions present lacks chloroplasts.

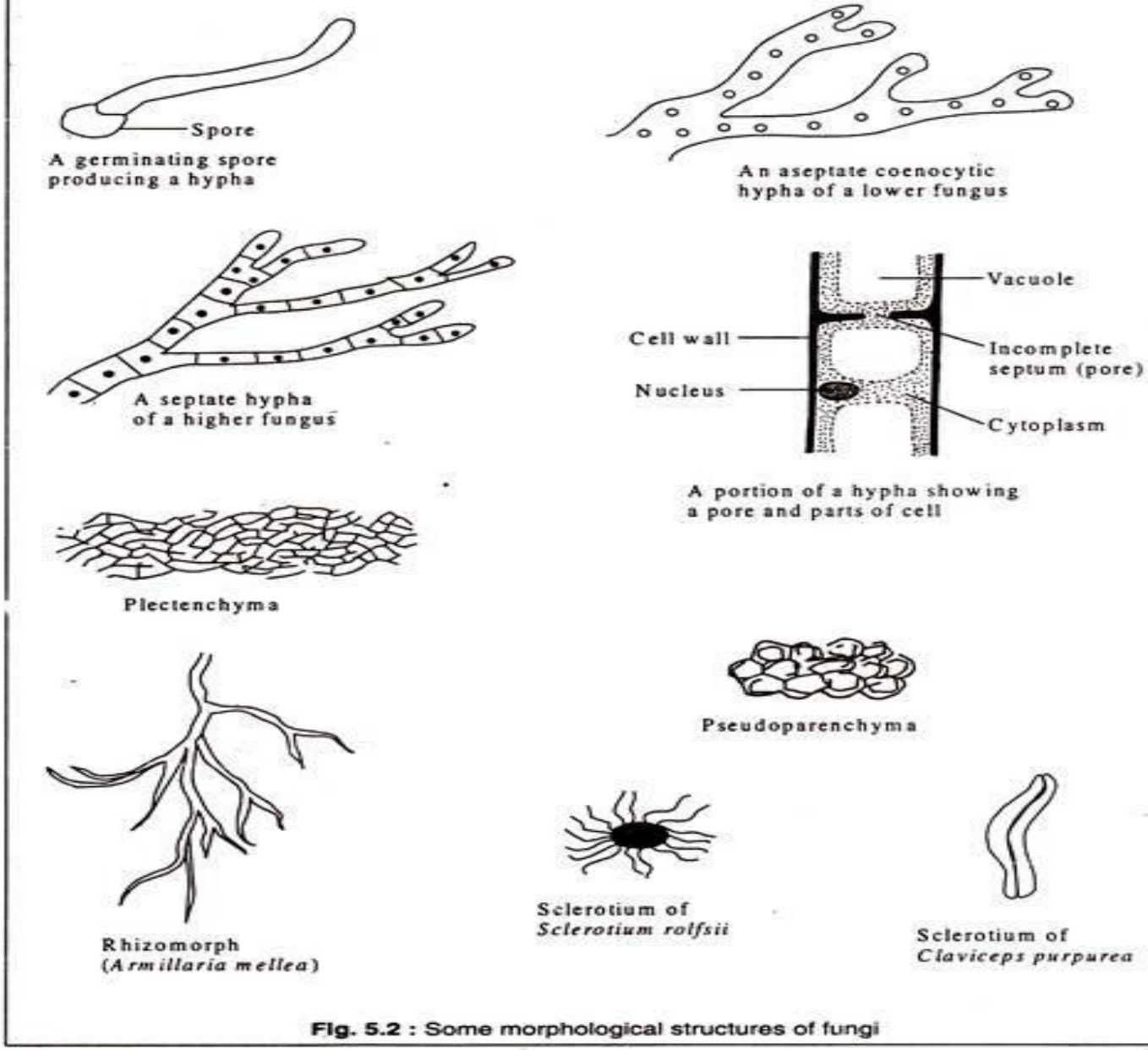
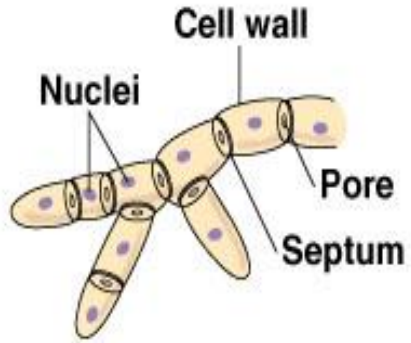
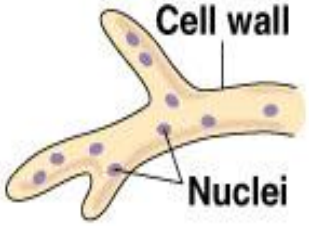


Fig. 5.2 : Some morphological structures of fungi

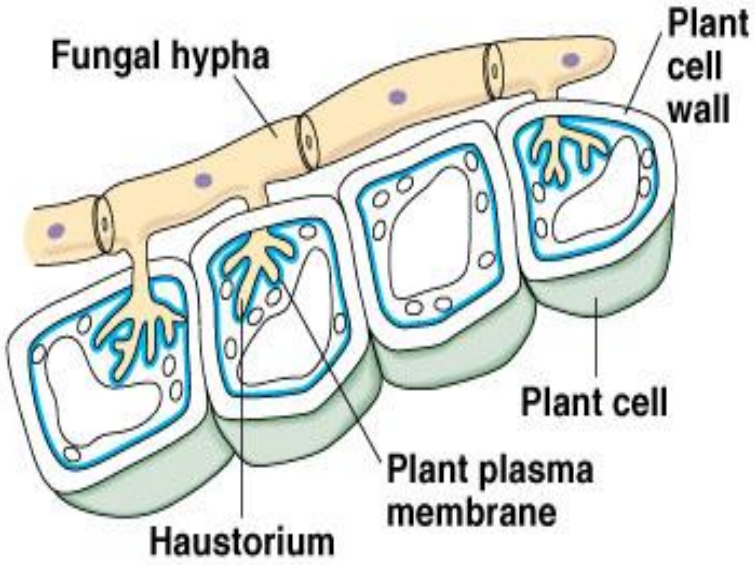
Modifications of hyphae



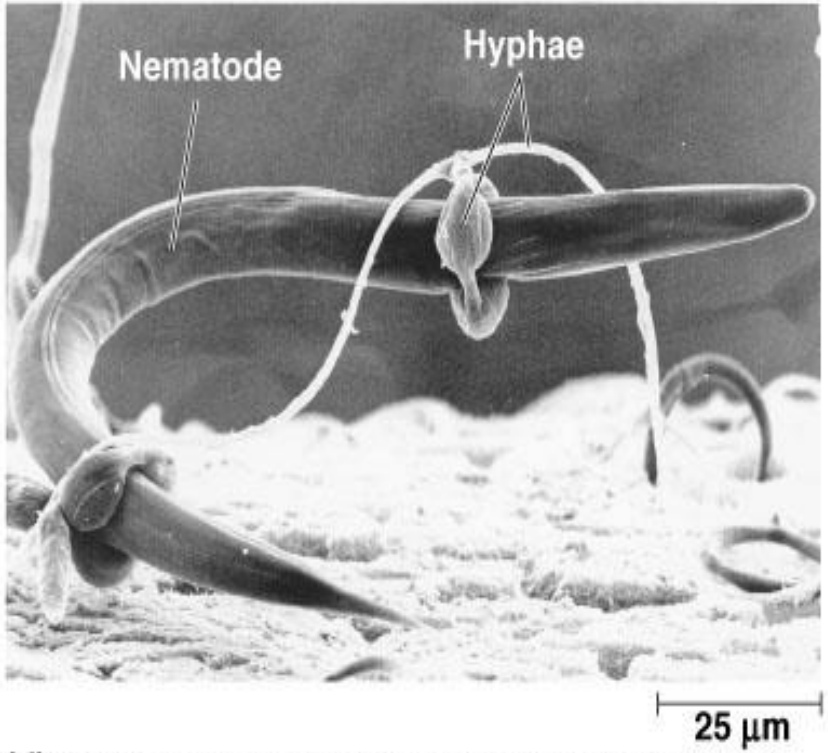
(a) Septate hypha



(b) Coenocytic hypha



(c) Haustoria



(d) Hyphae adapted for trapping and killing prey

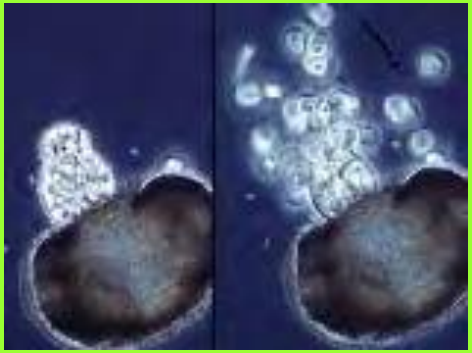
Classification of Fungi

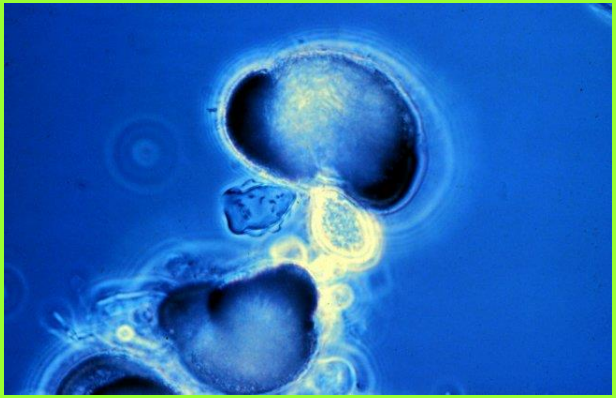
- Fungi are classified into 4 phyla (divisions) depending on the type of fruiting body they produce.
  - **Chytridiomycota**
  - **Zygomycota**
  - **Ascomycota**
  - **Deuteromycota**

Chytridiomycota – “chytrids”

- Simple fungi
- Produce motile spores - zoospores
- Mostly saprobes and parasites in aquatic habitats

Chytridium growing on spores





Chytriomyces growing on pine pollen

Zygomycota – “zygote fungi”

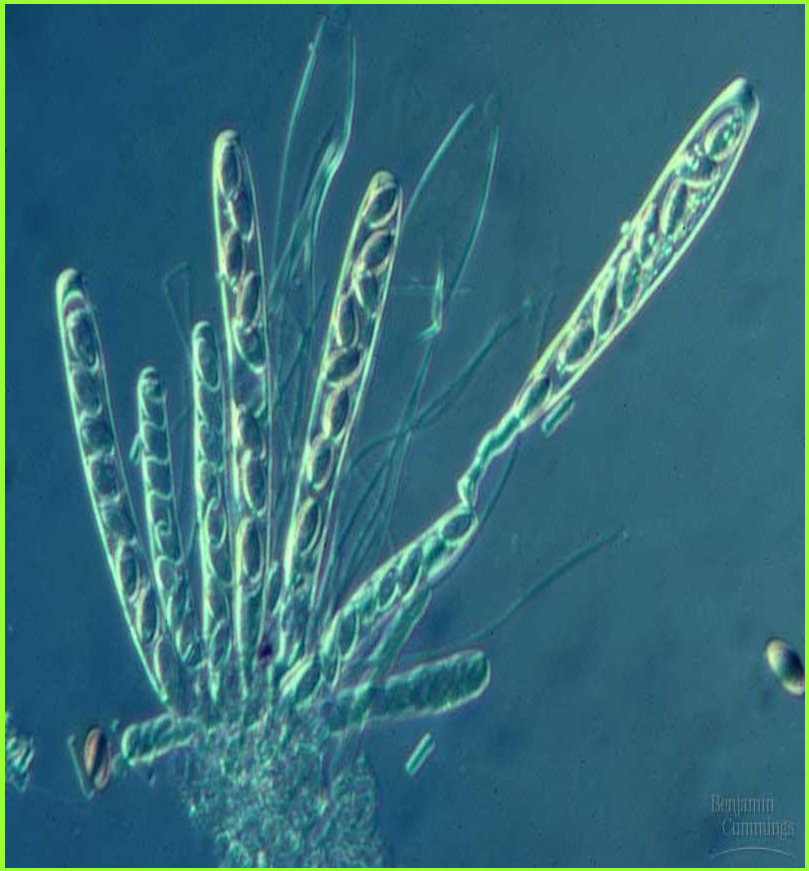
- Sexual Reproduction - zygosporangia
- Asexual reprod. – common (sporangia – bags of asexual spores)
- Hyphae have no cross walls
- Grow rapidly
- Decomposers, pathogens, and some form mycorrhizal associations with plants

Rhizopus on strawberries

Rhinocerebral zygomycosis

Ascomycota – “sac fungi”

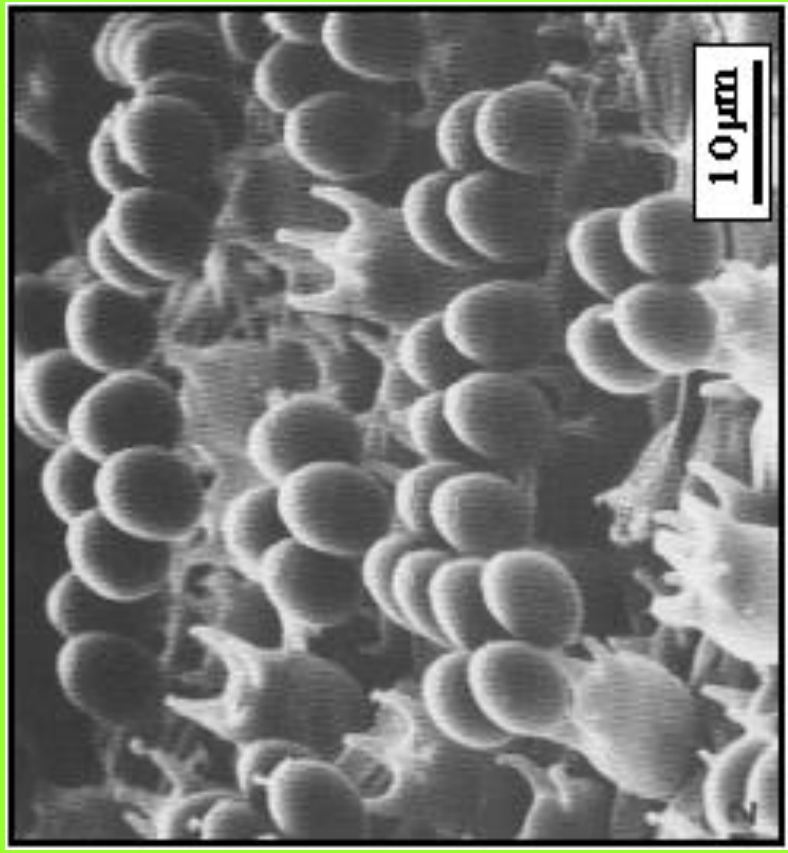
- Fruiting bodies form sacs of spores where fertilization occurs.
  - Examples: truffles, morels, yeasts
  - Usually, yeast reproduce asexually by budding
- Important plant parasites, decomposers & saprobes
- Yeast – *Saccharomyces*



A cluster of asci with spores inside

Basidiomycota – “club fungi”

- Sexual Reproduction – basidia
- Asexual reprod – not so common
- Long-lived **dikaryotic** mycelia
- Rusts & smuts –plant parasites
- Mushrooms, polypores, puffballs, boletes, bird’s nest fungi
- Decomposers, pathogens, and some form mycorrhizal associations with plants



SEM of basidia and spores

Deuteromycota – Form Phylum "Imperfect Fungi"

- Fungi that seldom or never reproduce sexually.
- Asexual reproduction by vegetative growth and production of asexual spores common.

HUMAN-FUNGUS INTERACTIONS

- **Beneficial Effects of Fungi**
  - Decomposition - nutrient and carbon recycling.
  - Biosynthetic factories. Can be used to produce drugs, antibiotics, alcohol, acids, food (e.g., fermented products, mushrooms).
  - Model organisms for biochemical and genetic studies.

- **Harmful Effects of Fungi**
  - Destruction of food, lumber, paper, and cloth.
  - Animal and human diseases, including allergies.
  - Toxins produced by poisonous mushrooms and within food (e.g., grain, cheese, etc.).
  - Plant diseases.