

FUNGI

The background of the slide features a pattern of stylized autumn leaves. The leaves are rendered in various shades of orange, from light tan to deep, dark brown, creating a layered and textured effect. The veins of the leaves are clearly visible, adding to the detail of the design. The overall color palette is warm and monochromatic, typical of fall foliage.

Characteristic of higher fungi .

- 1-It includes only .Two phyla – Ascomycota and Basidiomycota
- 2-Thallus in both consists of separate hyphae that form extensive mycelia,
Septa have pores that allow migration of cytoplasm, organelles and nuclei .
- 3-Asexual reproduction by conidia bearing on conidiophores
- 4-In sexual cycle, plasmogamy is separated from karyogamy – produces dikaryotic phase.
- 5-Sexual reproduction produces spores after meiosis – ascospores or basidiospores ($1n$)
- 6- Evidence from DNA sequences suggests that Ascomycota and Basidiomycota are sister groups but to date no indication of ancestors.

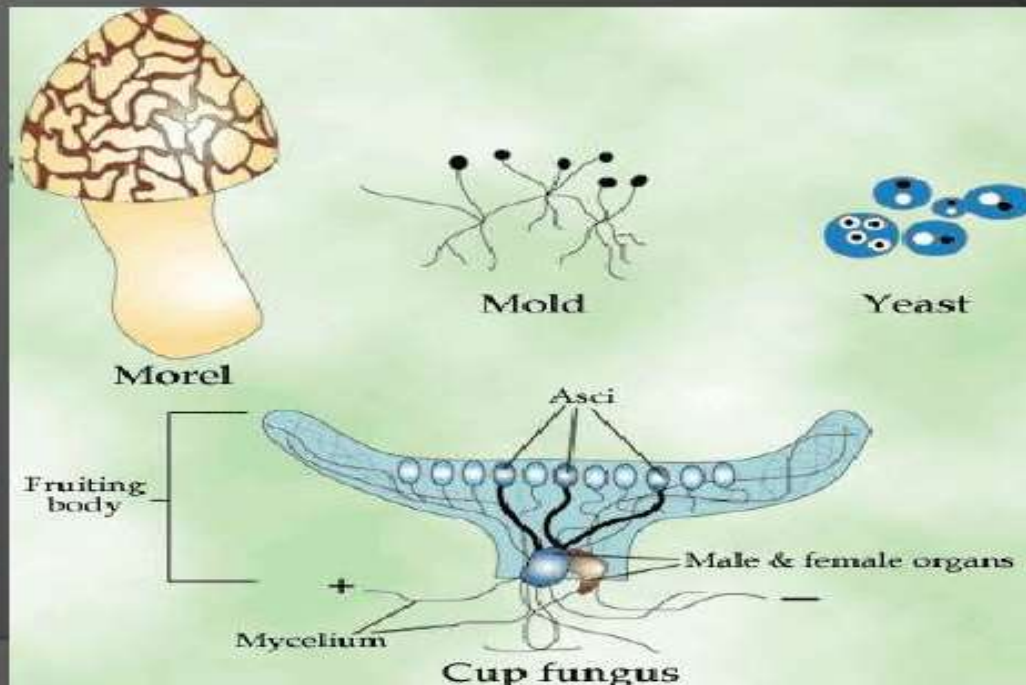
- **Phylum : Ascomycota**
- Its members are commonly known as the **sac fungi** **this name comes from forming sexual spore (ascospore)**. They are the largest phylum of Fungi, with over 64,000 species. Among the Ascomycota are some famous fungi: *Saccharomyces cerevisiae*, (baker yeast) the yeast of commerce and foundation of the baking and brewing industries, *Penicillium chrysogenum*, producer of penicillin, *Morchella esculentum*, the edible morel, and *Neurospora crassa*, **using as a model in genetic studies**. There are also some in famous Ascomycota, a few of the worst being: *Aspergillus flavus*, producer of aflatoxin, the fungal contaminant of nuts and stored grain that is both a toxin and known natural carcinogen, *Candida albicans*, cause of thrush, diaper rash and vaginitis and some species cause powdery mildew on plants like - *Erysiphe* sp. is caused powdery mildew on grasses and cucumberaceae plants

■ Characteristics of Ascomycota

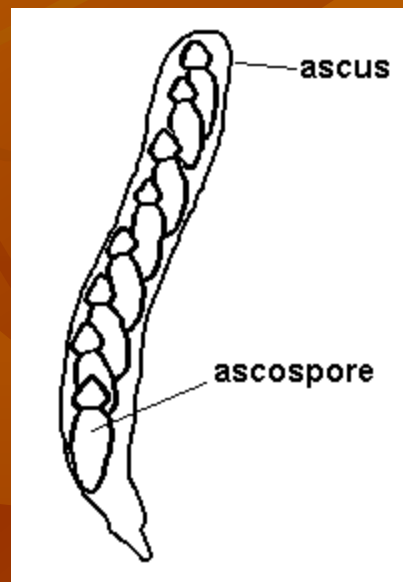
- 1-Somatic phase :Most have either unicellular like yeast or filamentous growth forms
Hyphae have perforated septa.
- 2-Almost all ascomycetes are terrestrial or parasitic. However, a few have adapted to marine or freshwater environments.
- 3-The cell walls of the hyphae are variably composed of chitin and β -glucans, just as in Basidiomycota.

- 5-Includes yeast, cup fungi, truffles, powdery mildew, & morels(true mushrooms).

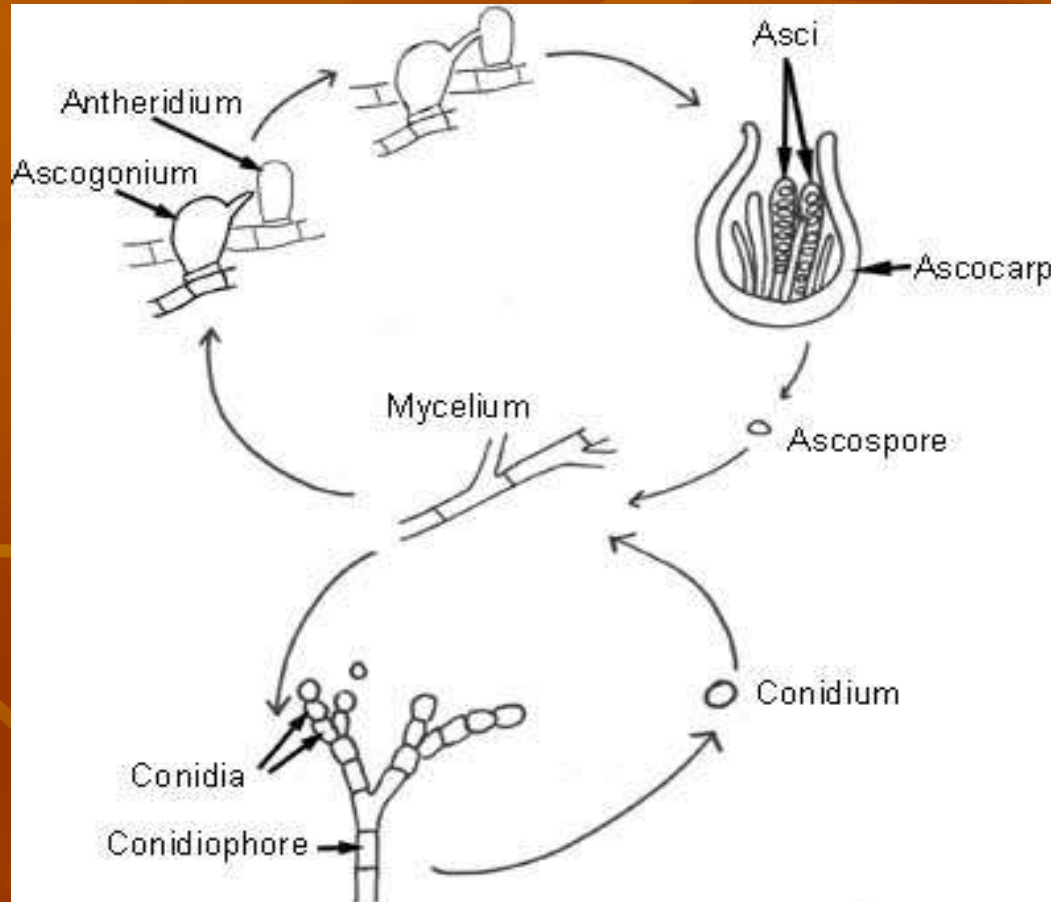
Structure



- 6- Sexual reproduction by forming ascospores produce inside sacs are called asci(singular :ascus) ,Most asci are cylindrical, or globose each ascus has 8 ascospores .
- 7- Most produce multicellular fruiting body – the ascocarp in which the asci and ascospores are formed . Asci usually develop on an inner surface of the ascocarp , a layer called the hymenium or hymenial layer .
- **Ascocarp** – specialized hyphae formed by parent fungi during **sexual reproduction**
- 8-Characteristics of asci and ascocarp important in classification
- 9-Asexual reproduction – production of conidia bearing on conidiophores or budding .
- 10-Many of the Deuteromycetes (imperfect fungi group) thought to be asexual or anamorphs of Ascomycota.
- 11-Previous hypotheses that the Ascomycota evolved from red algae (similarities in morphology of sexual structures) and Mucorales



■ Life cycle of Ascomycota



- In asexual reproduction, spores are formed as the result of **mitosis** (nuclear division in which the number of chromosomes in the daughter nuclei is the same as it was in the parent nucleus). The resulting **mitospores** (also called **conidia**) are released in large numbers, and allow the ascomycete to disperse over a wide area.

- Sexual reproduction involves the formation of an **ascus** (plural; asci) by the fusion of two hyphae of different mating types. The ascus is shaped like a bag, and acts like a bag in that it contains the spores. These spores are called **ascospores** and are formed by the fusion of two nuclei (karyogamy) to form a diploid nucleus. This diploid nucleus divides by **meiosis** (nuclear division with reduction in the number of chromosomes) to give four spores, which then divide by **mitosis** to give eight haploid **ascospores**.

- These ascospores have thick cell walls, and have the ability to persist in the environment for a long time. The structure of the ascus varies within the group except yeasts tend to have single asci (naked asci) not forming ascocarp, others have their asci formed within a fruiting body called an **ascocarp**. These occur in several different forms:

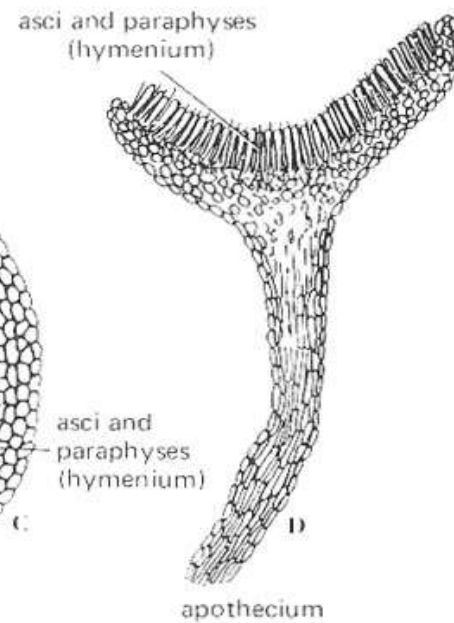
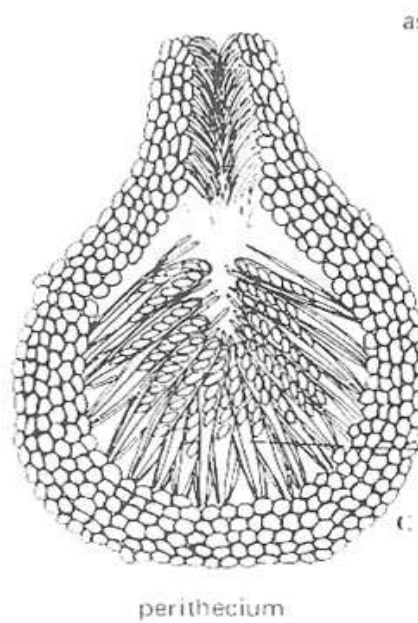
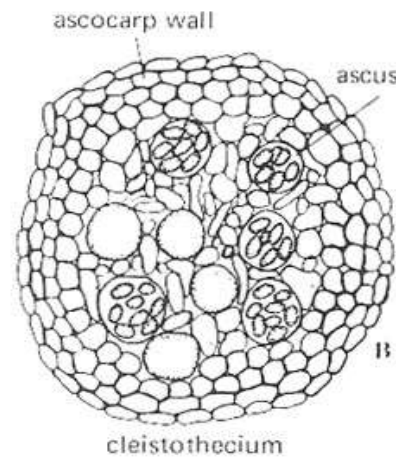
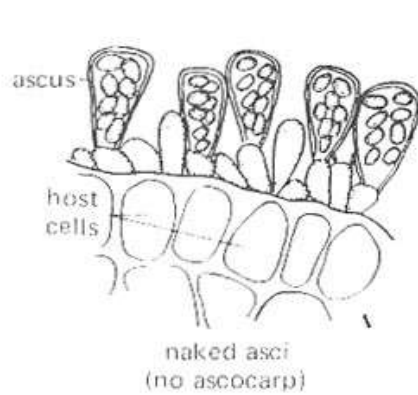
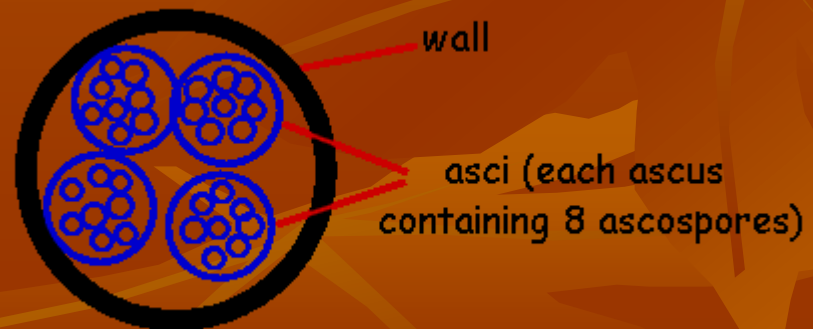


FIGURE 33-5
Four ways in which
Ascomycetes bear their asci.
(From Alexopoulos, [1962]. By
Wiley & Sons, Inc.)

- Use of ascocarps in the classification of fungi belonging to the Ascomycota:
- 1. Hemiascomycetes (includes yeasts)
- In this case the asci are NOT ENCLOSED in an ascocarp.
- Asci are naked

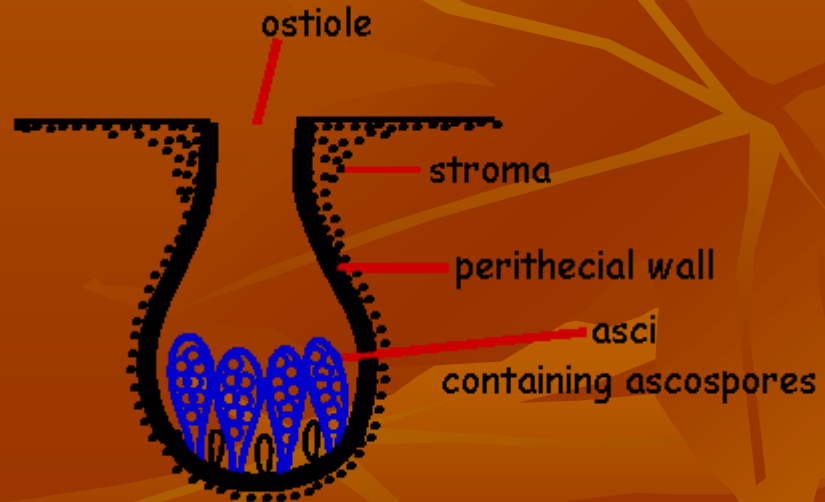
■ 2. Plectomycetes

- Fungi belonging to this group form CLEISTOTHECIA.
- These are round, completely closed ascocarps, possessing no natural opening.
- The asci are arranged irregularly within them.
- When mature the cleistothecia burst open to release their asci and ascospores.



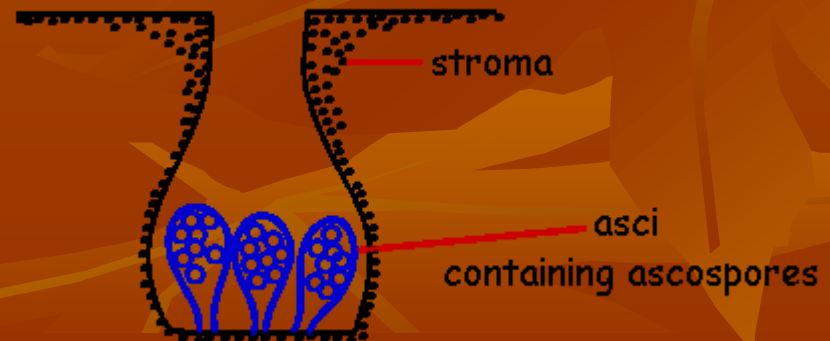
■ **Pyrenomycetes**

- Fungi belonging to this group form PERITHECIA.
- Perithecia are spherical or flask-shaped ascocarps.
- They open via a neck-like **OSTIOLE** with a terminal pore through which the ascospores are liberated.
- The asci are arranged in an orderly layer at the base of the cavity.

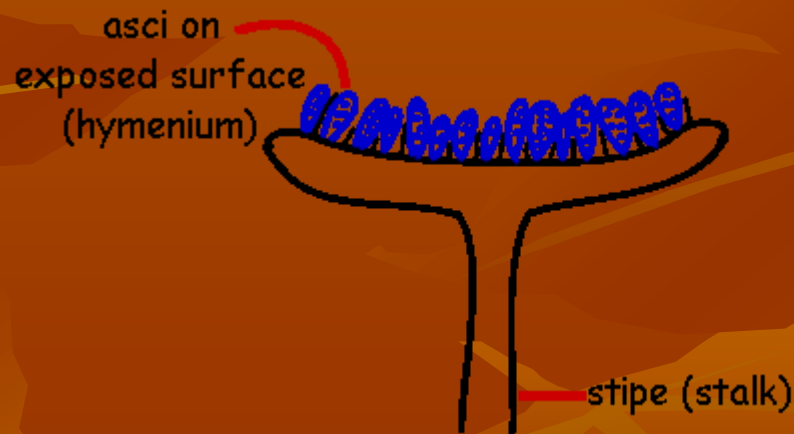


■ 4. Loculoascomycetes

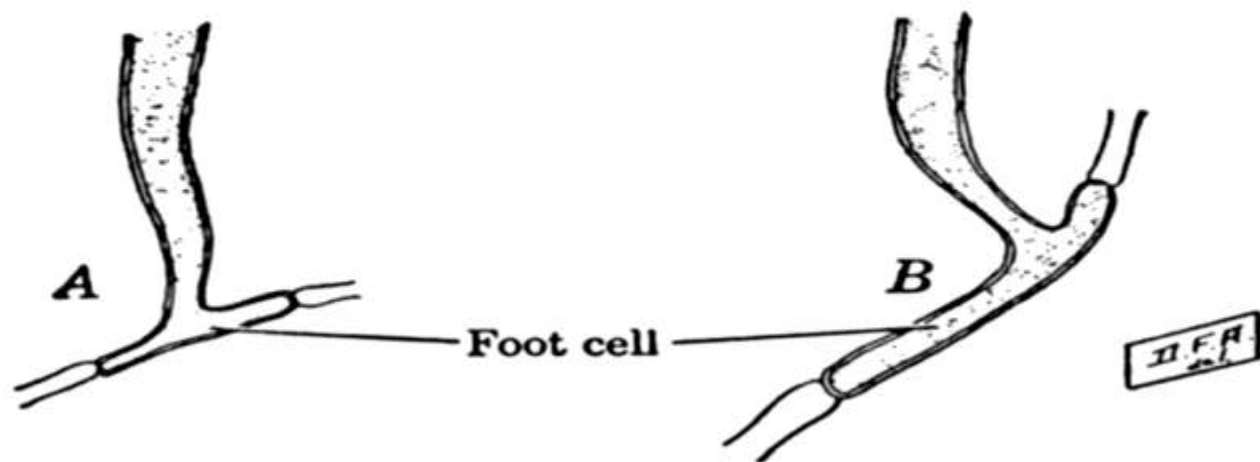
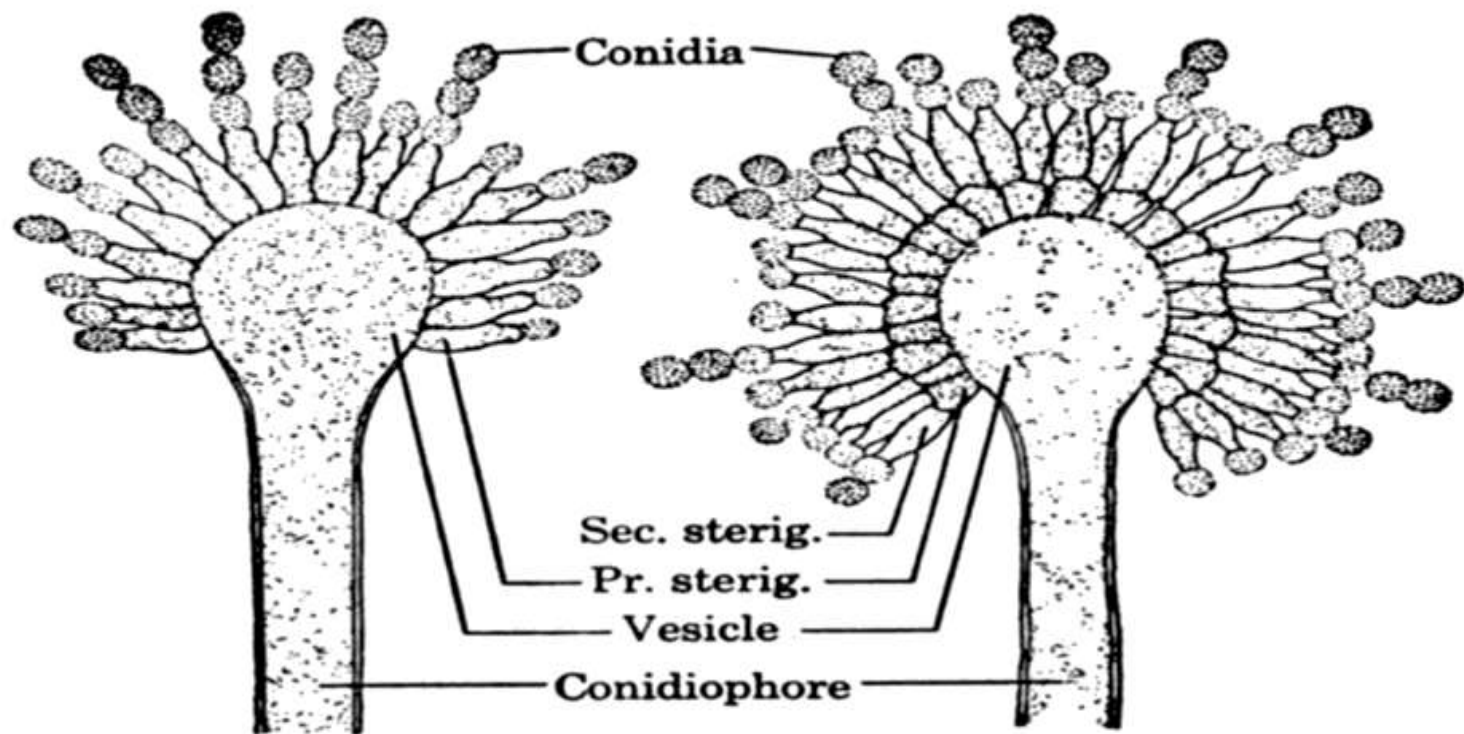
- Fungi belonging to this group form ASCOSTROMATA (or PSEUDOTHECIA).
- Ascostromata resemble perithecia but in the former there is no wall surrounding the central region of the ascocarp - only a cavity within the mass of hyphal tissue (STROMA) in which the asci are located. Ascocarp with asci formed in cavity (locule) within stromatic tissue



- **5. Discomycetes**
- Fungi belonging to this group form APOTHECIA.
- An apothecium is an OPEN- or CUP-SHAPED ascocarp.
- The asci are arranged on the exposed surface (HYMENIUM).



- **Examples of Ascomycota**
- ***Aspergillus***
- Anamorphic genus – close to 100 species
- 11 different teleomorphic genera produce *Aspergillus* conidia on conidiophores, including *Eurotium*, *Emericella*
- Common fungi found in air, soil, water
- Grow on a variety of substrates, in humid climates found growing on clothing, shoes, etc.
- Important as contaminants of stored grain, species produce aflatoxin
- Produce characteristic conidiophore
- Conidia produced by phialides – flask shaped conidiogenous cells
- Have a characteristic foot cell



- *Penicillium* spp.
- Over 95 species connected to 3 teleomorphic (sexual reproduction) genera – *Talaromyces*, *Eupenicillium*, *Carpentales*
- Very common in soil, conidia found in air, water, soil
- Food spoilage – on citrus fruits, jelly, cheeses
- Produce penicillin and other chemicals industrially
- *P. roqfertii*, *P. camembertii* used to make cheeses
- Asexual conidiophore – not swollen at tip, no foot cell
- Phialides arranged in a brushlike manner

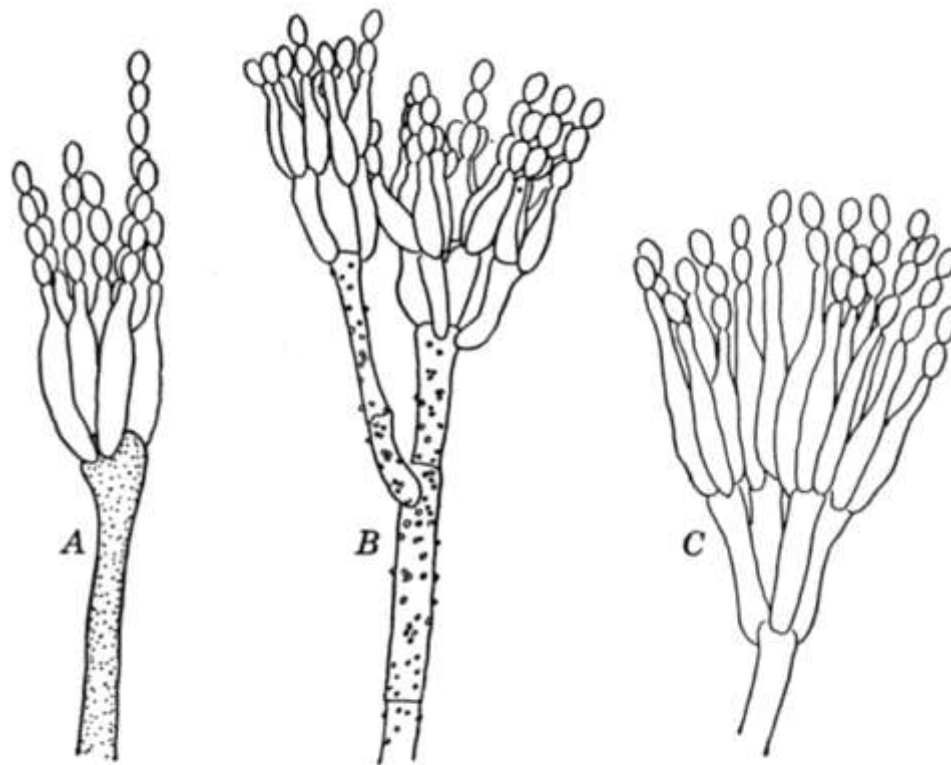
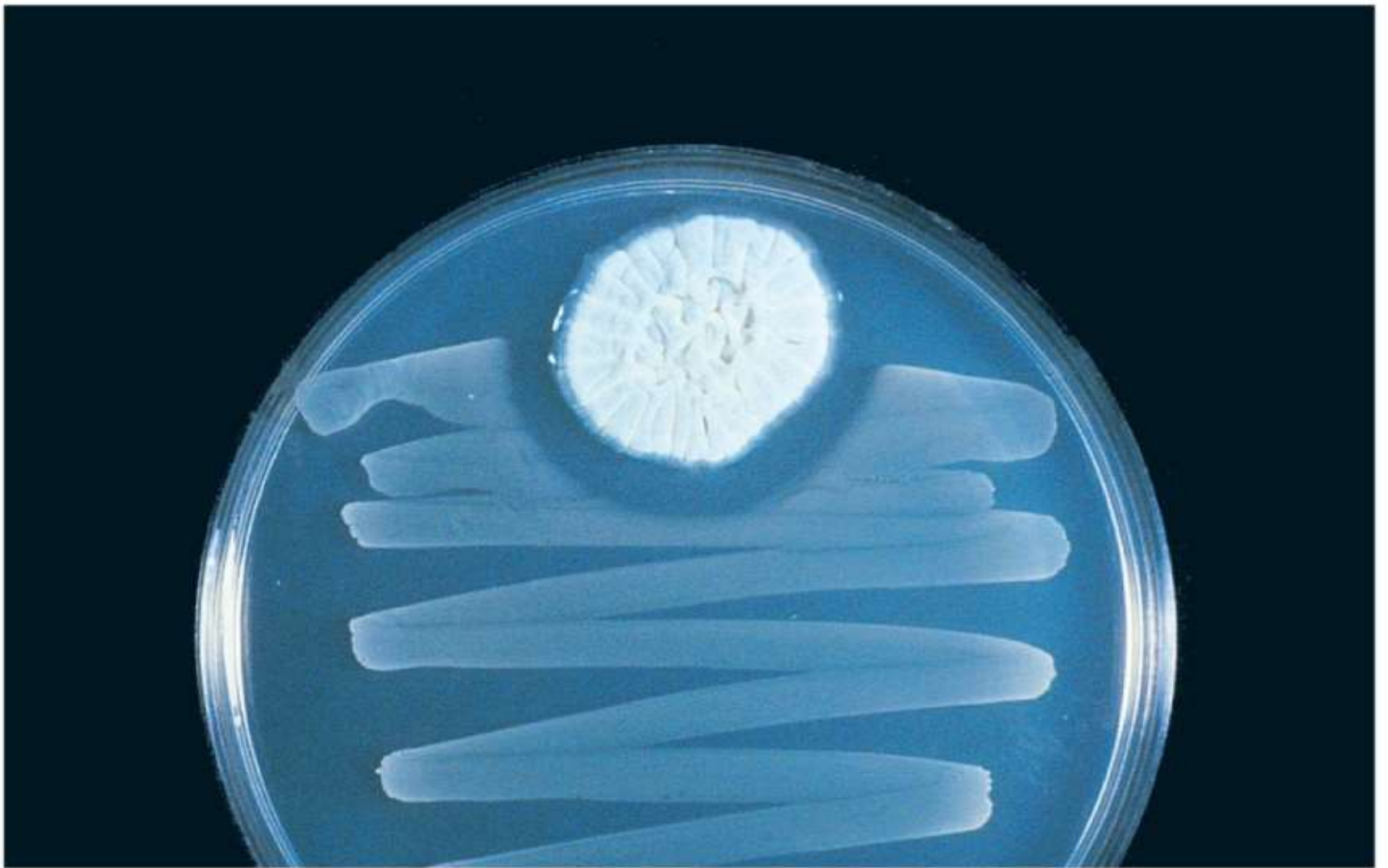


Figure 13-10. Three types of conidiophores of *Penicillium*. A. *Penicillium thomii*. B. *Penicillium lanosco-coeruleum*. C. *Penicillium wortmanni*.



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