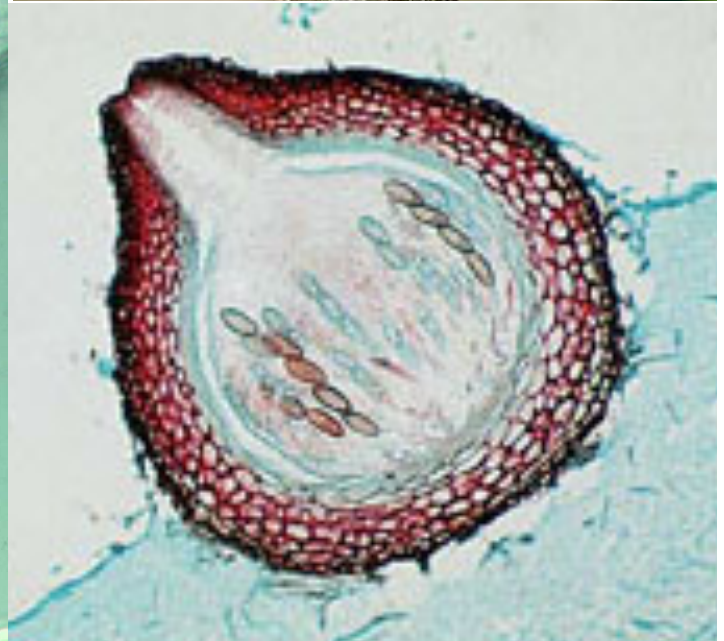


# Overview of Ascomycota



# Ascomycota

- ~ 6,350 Genera
- ~ 64,200 Species

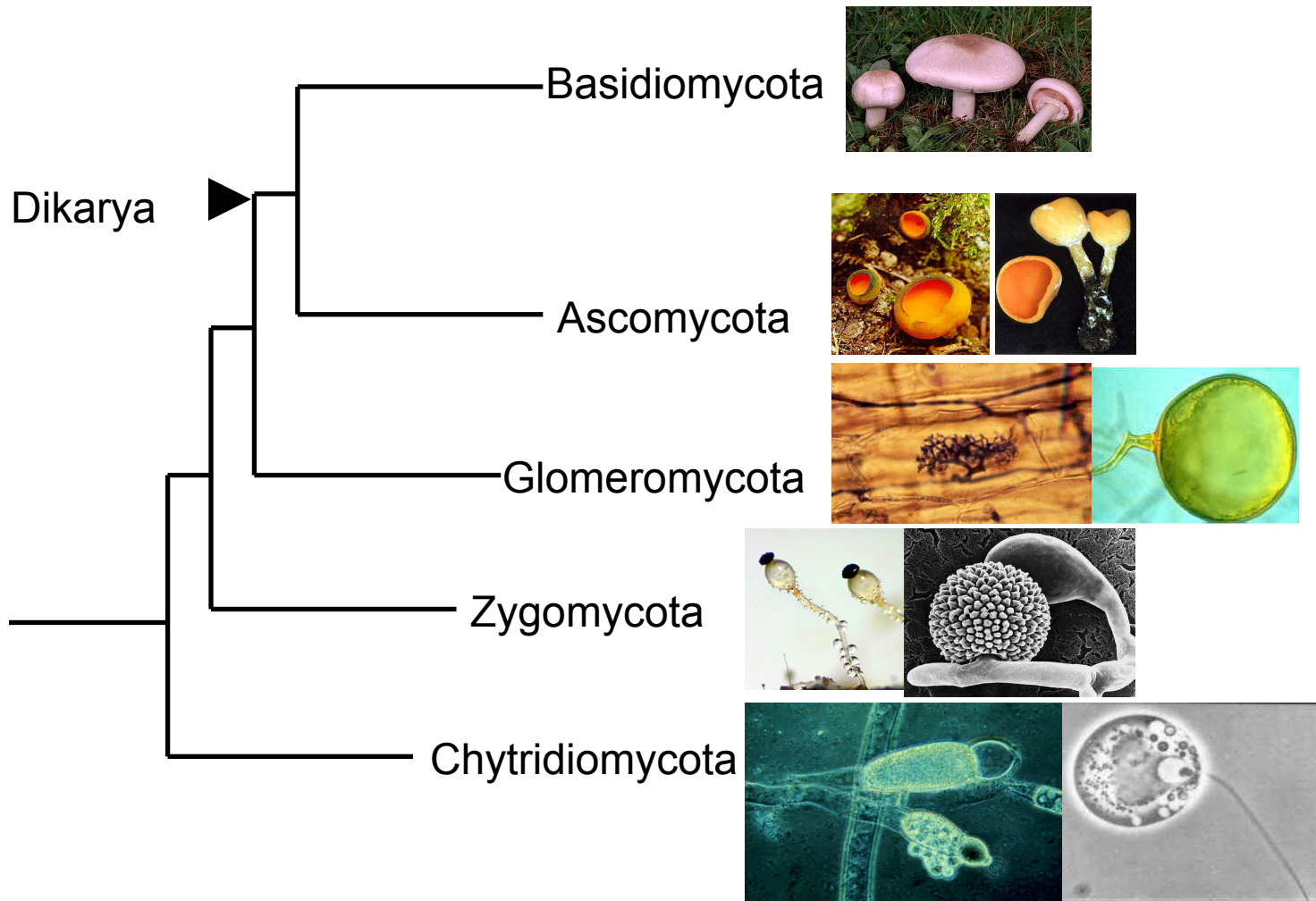
compared to Basidiomycota

- ~ 1,350 Genera
- ~31,500 Species

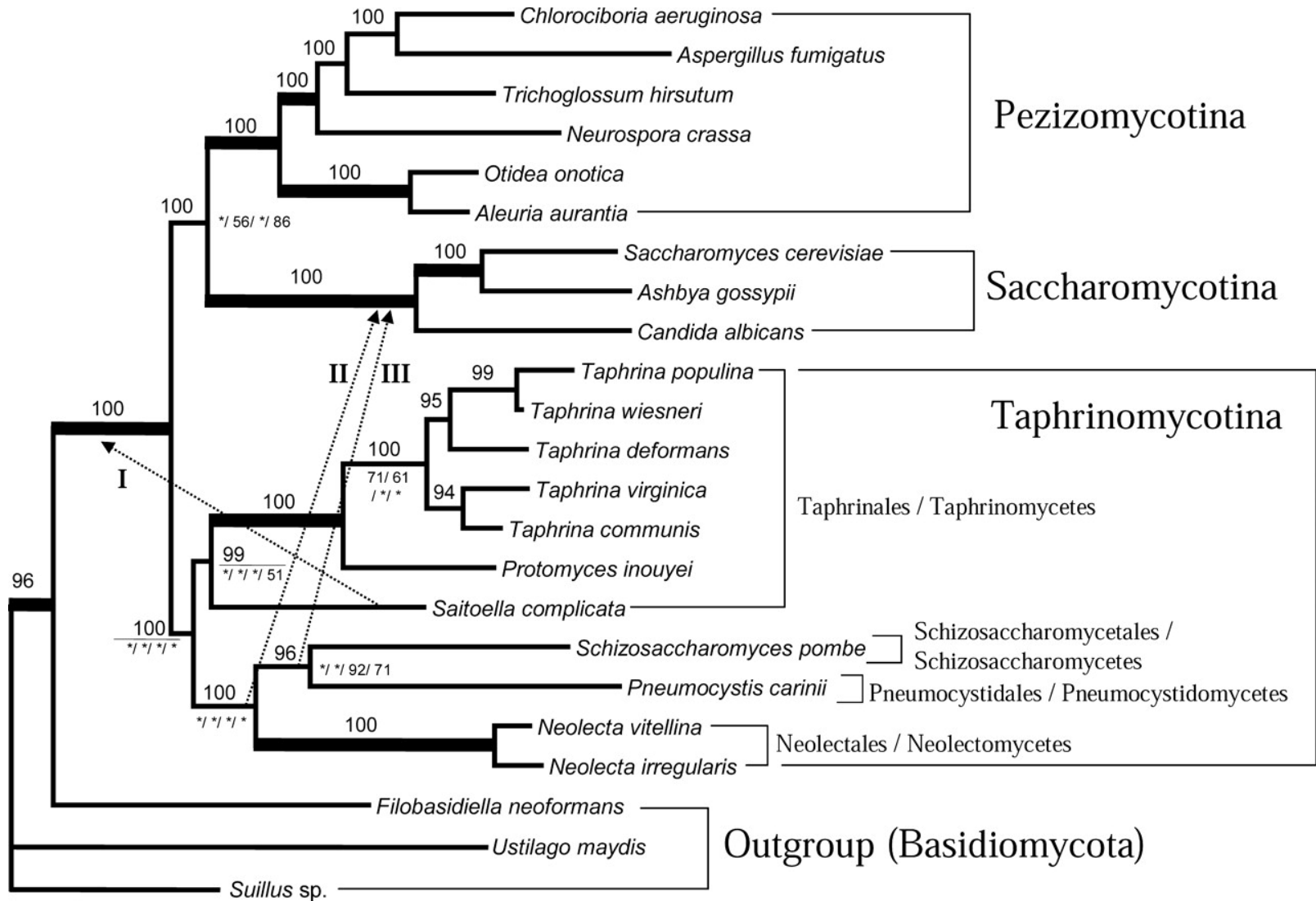
Between 17,000 - 20,000 species (~ 30 - 40%) of Ascomycota are lichenized

Many species are only known as asexual forms

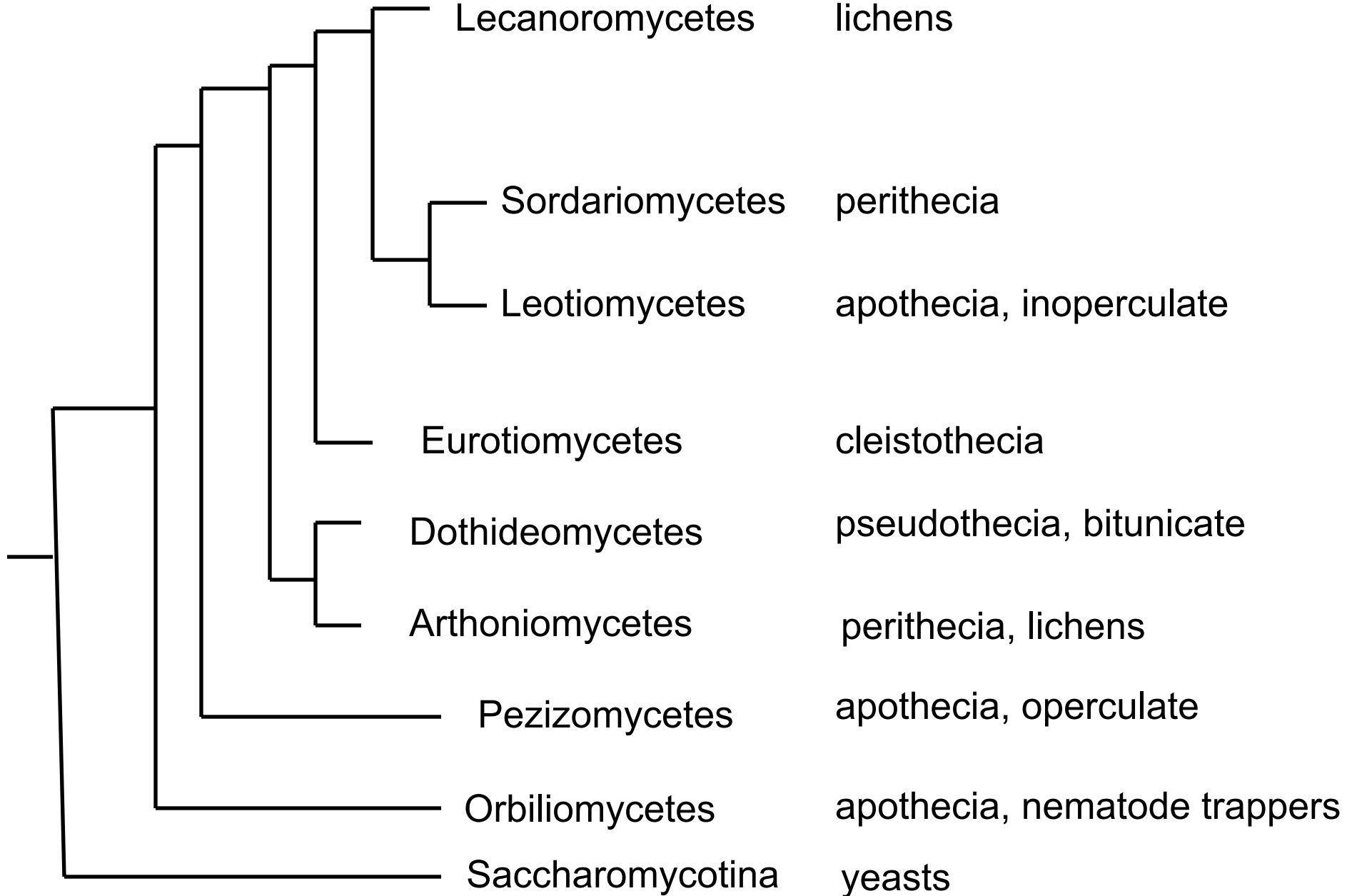
# Dikarya: Ascomycota and Basidiomycota “Higher Fungi” share common ancestor



# Subphyla of Ascomycota



# Pezizomycotina is the largest subphylum of Ascomycota



Ascomycetes and basidiomycetes both have a dikaryotic phase

Dikaryophase in Ascomycota limited to ascocarp primordia

Hyphae have regular cross walls (septa), but contiguous cytoplasm

Ascomycota septa are simple: no dolipore, no clamp

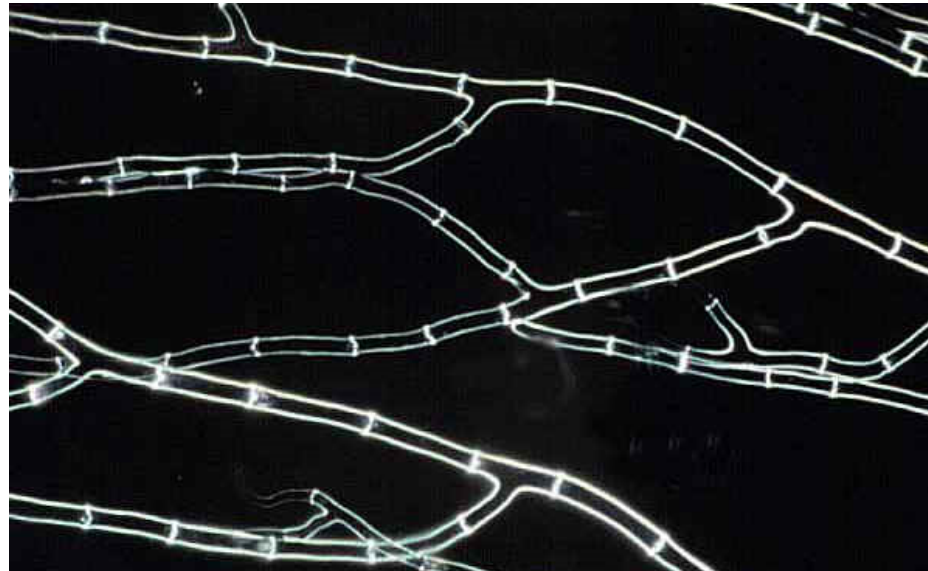
Woronin bodies associated with septal pores

Cell walls primarily chitin, hyphae and conidia may have melanins

Dominant nuclear condition is haploid, monokaryotic

Differentiated tissue types, sporocarps

macro- to microscopic



# Other cell wall structural components

Fungal melanins—dark brown to black pigments, phenolic polymer

Give brown color to pigmented or dematiaceous fungi

Can be related to pathogenicity in plant and human pathogens

Usually present in spores adapted for survival over long periods

Add rigidity, mechanical strength to cell walls

Protect cells from UV light damage, solar radiation, desiccation, etc

Confer resistance to enzyme lysis,

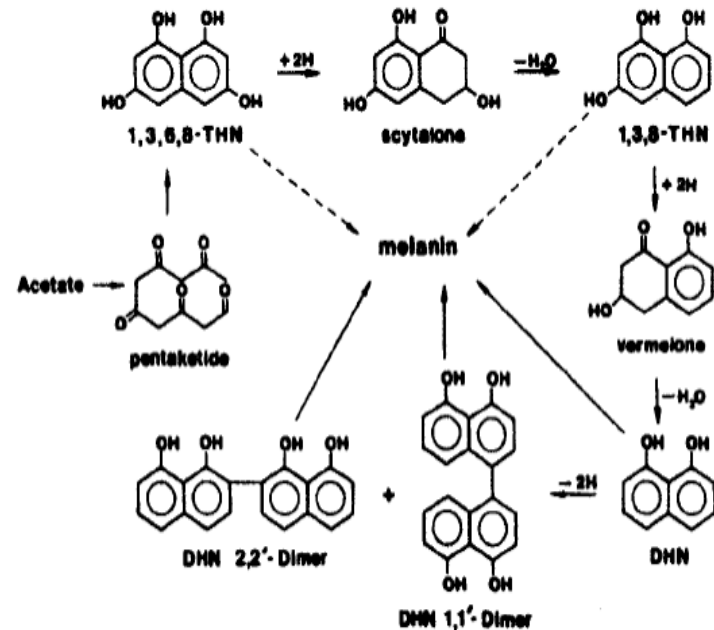
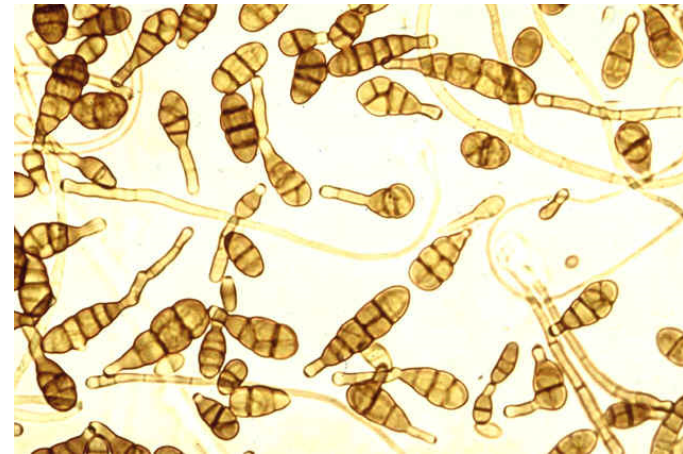
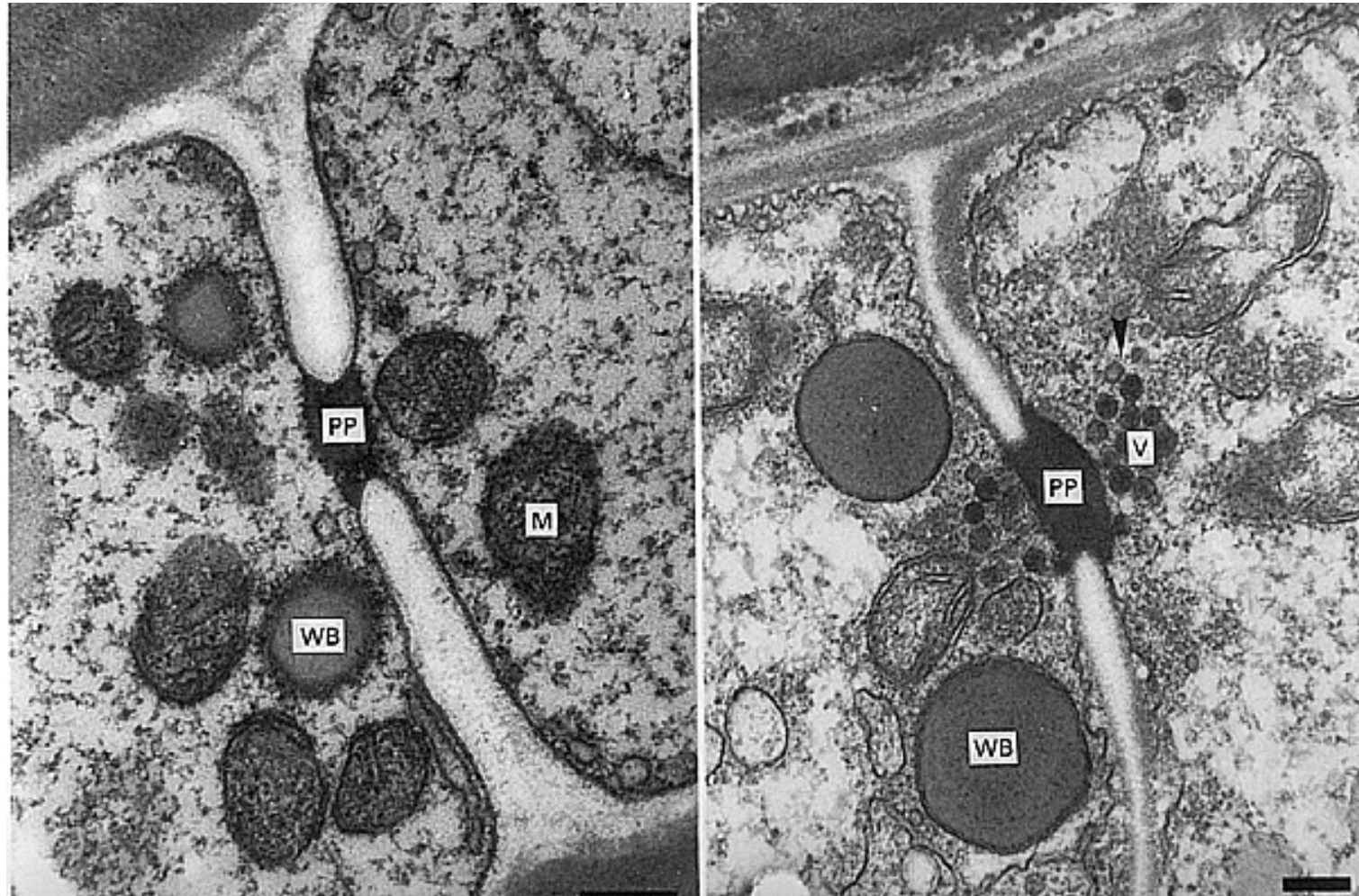


Figure 1 1,8 Dihydroxynaphthalene (DHN) melanin biosynthetic pathway (reprinted from 4). 1,3,8-THN = 1,3,8 trihydroxynaphthalene; 1,3,6,8-THN = tetrahydroxynaphthalene.

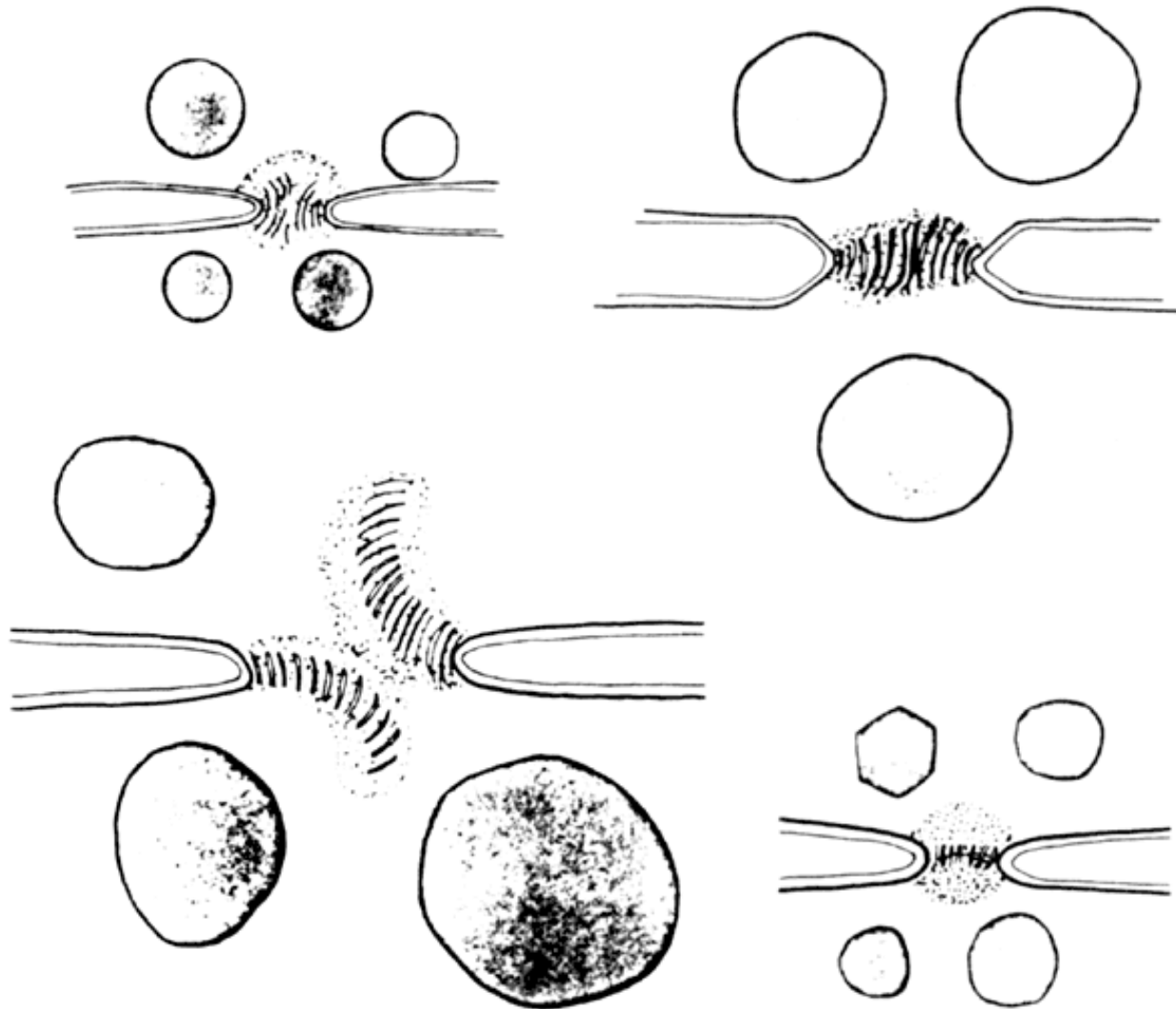


# Variations in septum structure



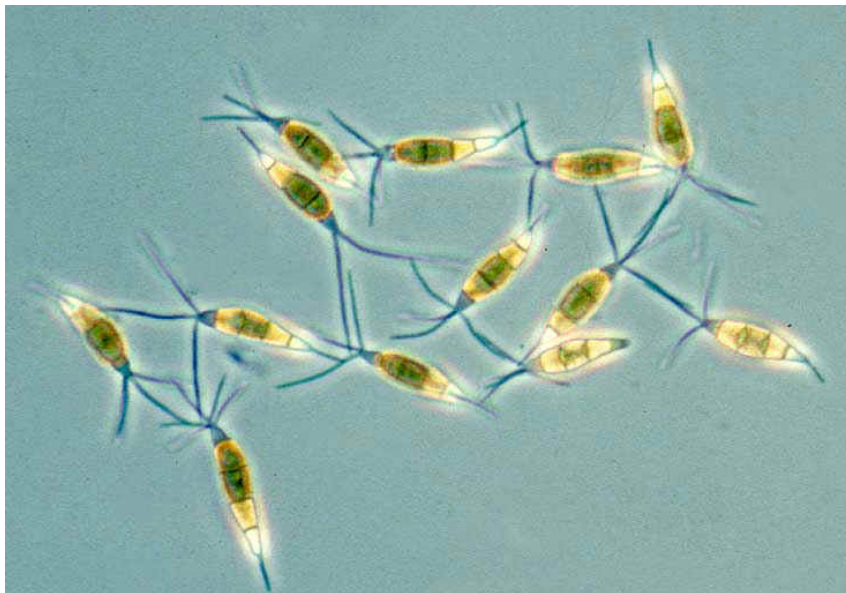
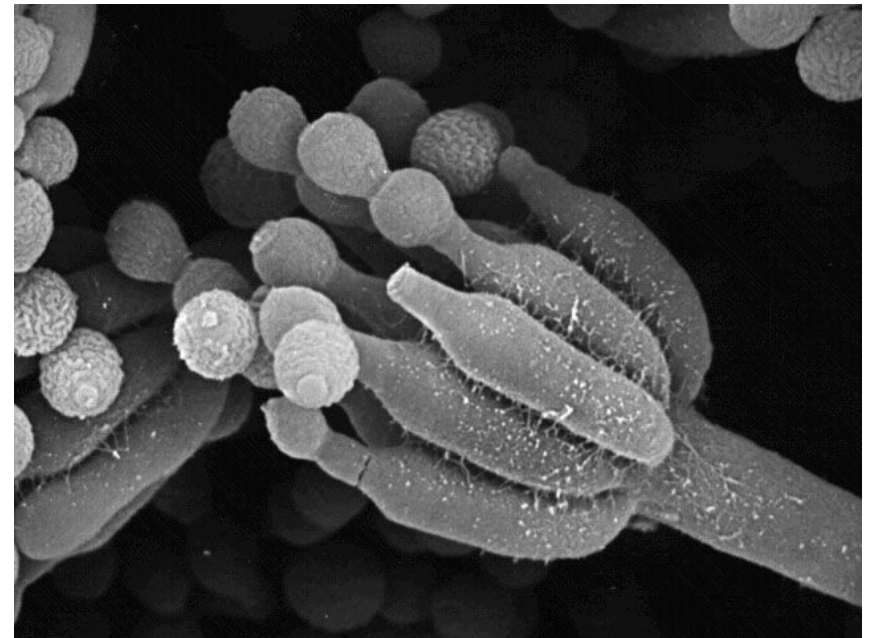
Ascomycete septa showing septal pore and Woronin bodies





Woronin bodies

Asexual reproduction very common, very diverse in Ascomycota



## Ascomycetes often have two (or more) distinct reproductive phases

- meiotic: asci and ascospores (meiospores): Teleomorph
- mitotic: mitotic spores (conidia): Anamorph
- holomorph: the whole organism and all its morphs
  - one teleomorph may have multiple anamorphs (synanamorphs)
  - one anamorph type may be associated with several unrelated teleomorphs

Ascomycete classification is based on teleomorphs, which reflect natural (phylogenetic) relationships

**BUT:** many ascomycetes are known only by their asexual stages.

“Deuteromycetes”, “Deuteromycota”

- former classifications of anamorphic species
- no longer accepted in fungal taxonomy
- an idea that deserves obscurity

HONK if you hate Deuteromycota



# Primary morphological characters of Ascomycota

**ascocarp or ascoma** - sexual reproductive sporocarp  
Fertile layer a hymenium, asci plus sterile elements

Apothecium

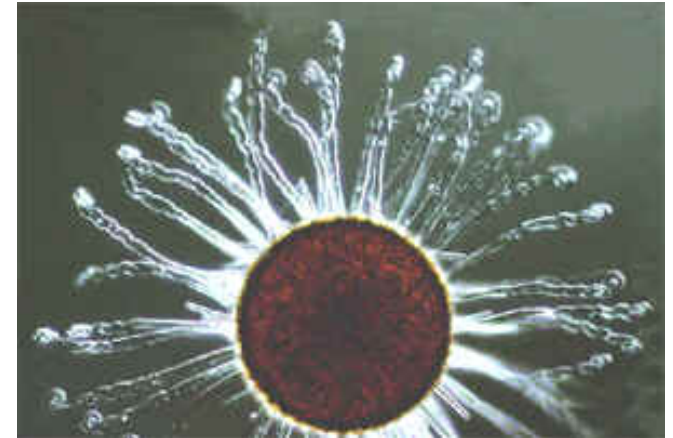
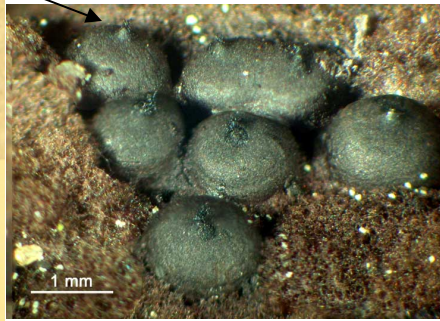
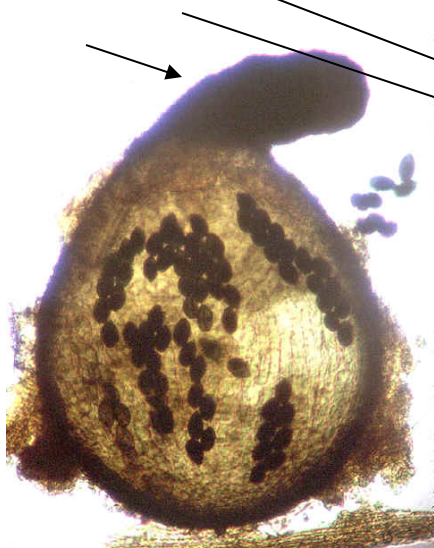
Perithecium

Cleistothecium

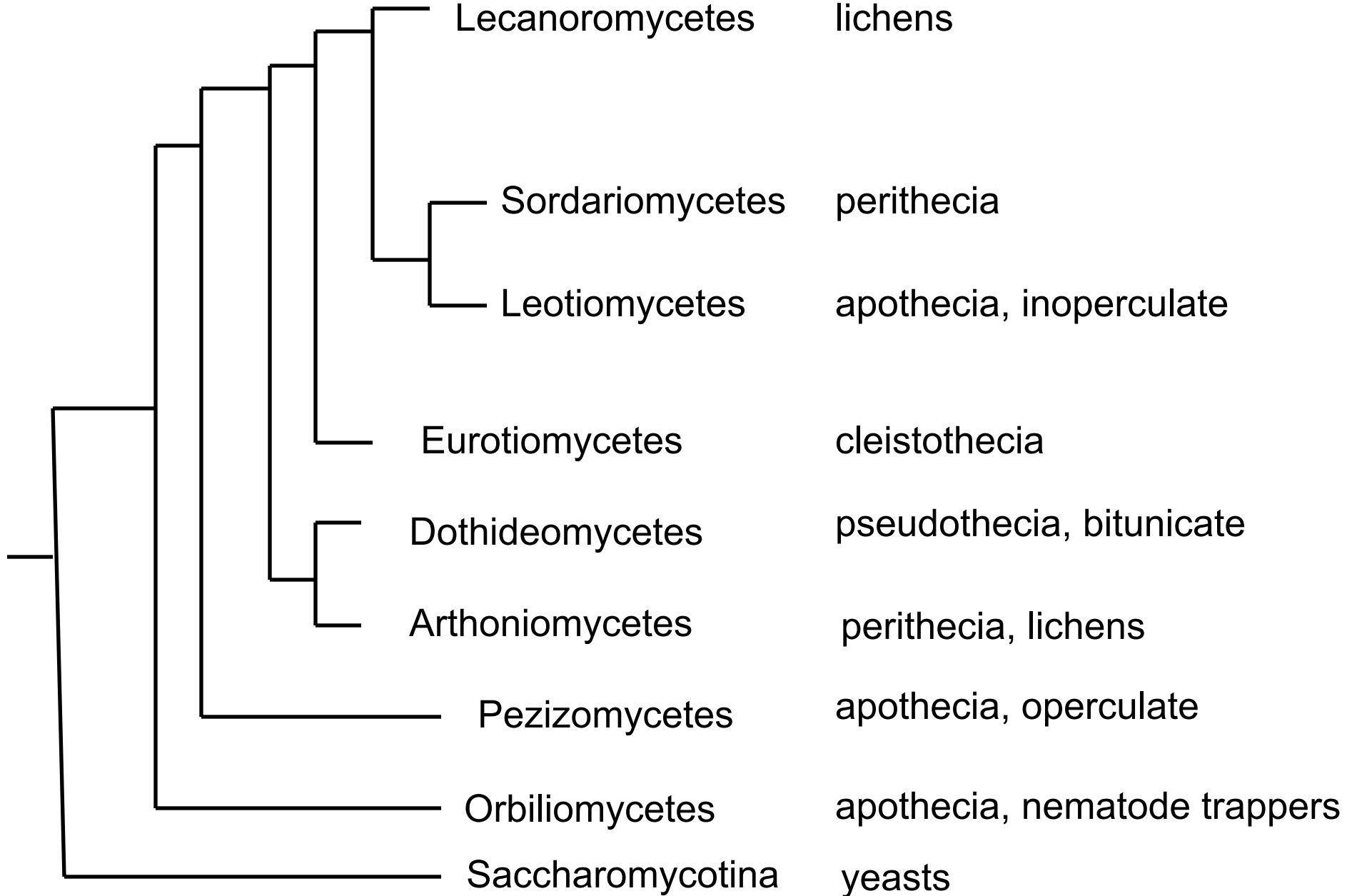
Pseudothecium



ostiole



# Pezizomycotina is the largest subphylum of Ascomycota



- **ascus** - a sac-like cell located within the ascocarp
  - site of karyogamy, meiosis, and usually one or more mitotic divisions
- **ascospores** - meiospores, cleaved from cytoplasm within the ascus
  - formed by “free cell formation”



**Ascomata or ascocarps** - sexual reproductive structure  
the equivalent of a basidiocarp  
**apothecium** - cup-shaped sporocarp  
- exposed hymenium  
- “discomycetes”

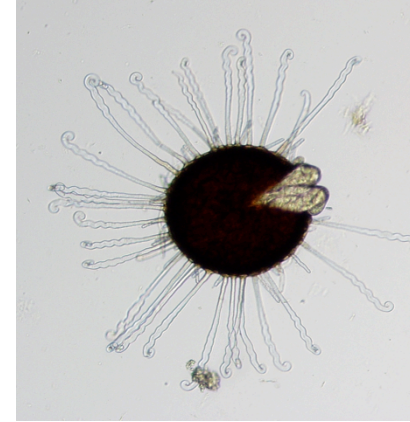




Rhytisma



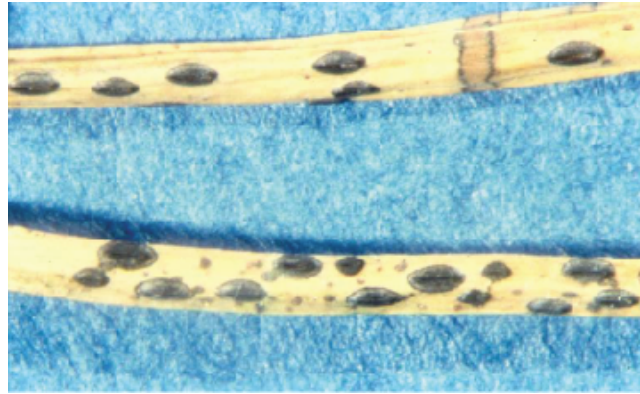
Cyttaria



Uncinula photo Bryce Kendrick



Leotia



Lophodermium



Sclerotinia photo APSnet



Phyllactinia photo Bryce Kendrick



Lachnellula



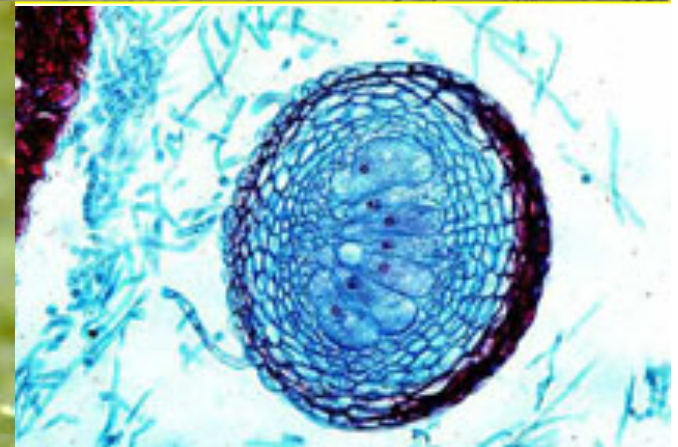
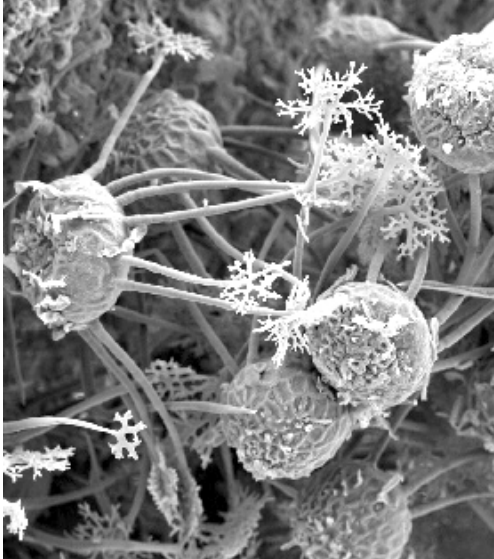
# perithecium

- “flask-shaped” sporocarp
- hymenium surrounded by fungal tissue
- ostiole; opening for spore release
- solitary or embedded in a stroma (pl stromata)
- “pyrenomycetes”



# cleistothecium

- completely closed sporocarp, no ostiole open by rupture of outer wall
- asci typically scattered
- “plectomycetes”



# pseudothecium

- ascocarp of Dothideomycetes
- indistinguishable from perithecium
- ascolocular development
  - one or multiple chambers (locules)
- asci bitunicate

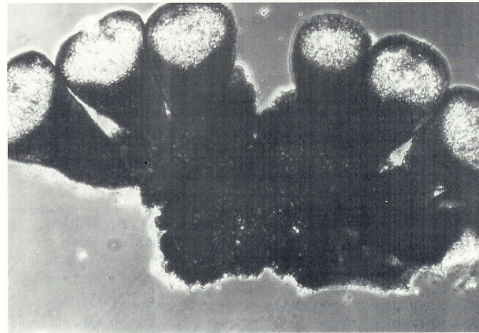
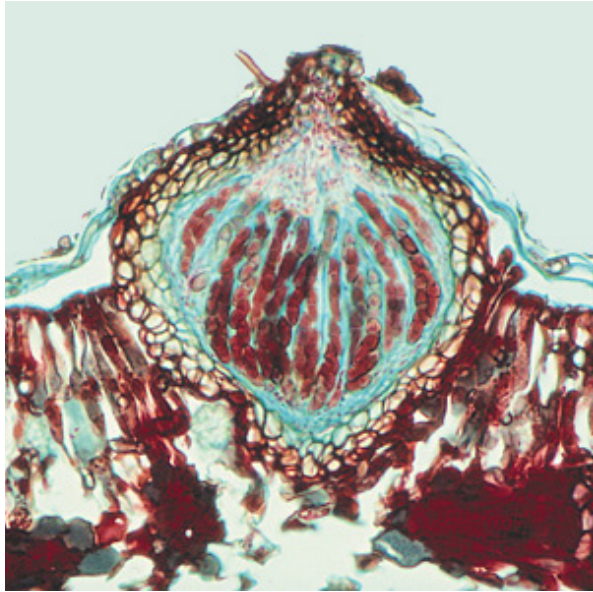
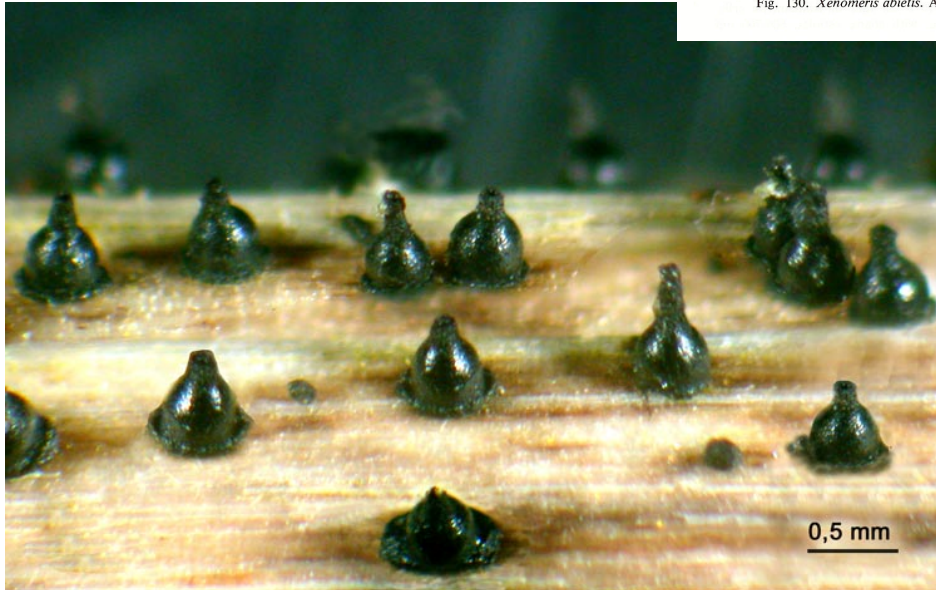
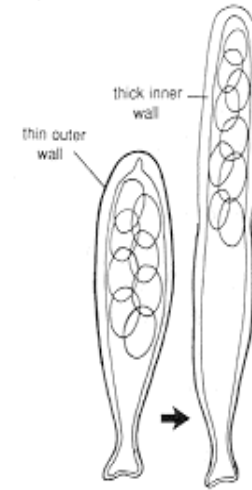
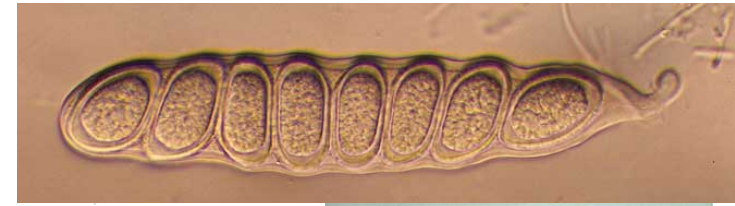


Fig. 130. *Xenomeris abietis*. Ascostromata on bark. Ascostromata.



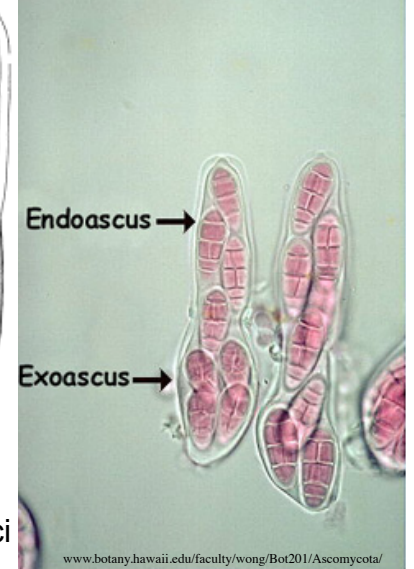
# Ascus

- spherical, clavate or cylindrical
- persistent or evanescent
- +/- iodone reaction of ascus walls
- operculate
- inoperculate
- unitunicate
- bitunicate
- prototunicate



Bitunicate asci

[www.mycolog.com/CHAP4a.htm](http://www.mycolog.com/CHAP4a.htm)



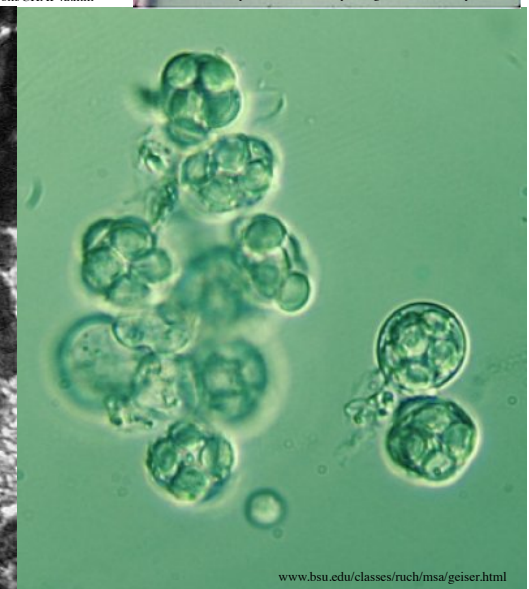
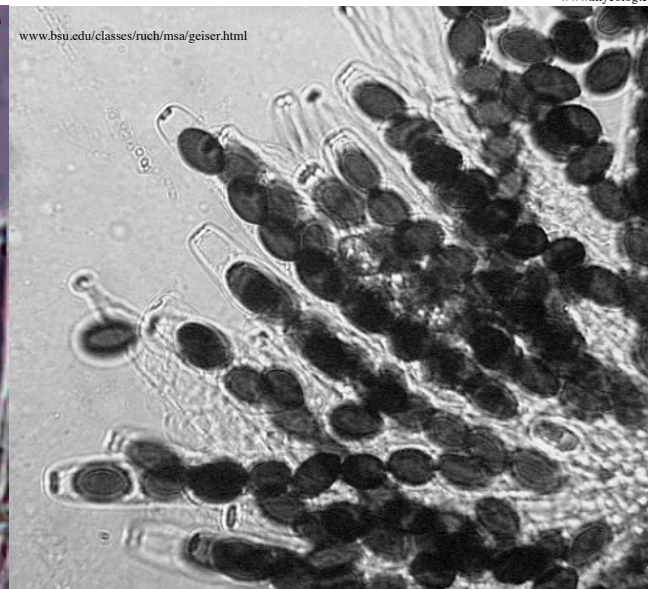
[www.botany.hawaii.edu/faculty/wong/Bot201/Ascomycota/](http://www.botany.hawaii.edu/faculty/wong/Bot201/Ascomycota/)



[www.mycolog.com/CHAP4a.htm](http://www.mycolog.com/CHAP4a.htm)



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