Ascomycetes II in lab tomorrow

- Quiz (Lab manual pages 35-50 ‘Ascos I’ & ‘Ascos II’ and intro pages for Ascos III (pp. 51-52) intro pages for Isolation of fungal pathogens (pp. 7-8).

- Look at Ascomycete diseases – signs and symptoms – emphasis is on asexual reproductive structures

- Attempt to isolate fungal pathogens into culture

Ascomycetes II

- Diseases caused by Ascomycete pathogens where the asexual spore stage(s) plays a prominent role

- This group has the largest number of pathogen species relative to other groups we will look at
Other names for this group:  
Fungi Imperfecti  
Deuteromycetes

Artificial taxonomic names created to solve a practical problem:

• Ascomycetes for which the ability to produce sexual spores has been lost  
  or  
• Sexual spores are only very rarely involved with the primary disease cycle

Practical problem:

Names given to fungal species are based on the morphology (size and shape) of the spores and sporocarps (e.g., ascocarps)

Owing to the rarity of observation of sexual stages in many Ascomycetes, potentially two Latin binomial names can be assigned to one organism

One name is based on the sexual spore (if it exists) and the other name is based on asexual spore (it usually exists)
### Teleomorphic name vs. Anamorphic name

<table>
<thead>
<tr>
<th>Based on sexual stage</th>
<th>Based on asexual stage</th>
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<tbody>
<tr>
<td>Spores formed by meiosis (ascospores)</td>
<td>Spores formed by mitosis (conidia)</td>
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<tr>
<td>Preferred terminology: <strong>Teleomorph</strong> “perfect stage”</td>
<td><strong>Anamorph</strong> “imperfect stage”</td>
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</tbody>
</table>

#### Examples:
- **Venturia inequalis**
- **Botryotinia spp.**
- **Giberella spp.**
- **Sclerotinia sclerotiorum**
- **Spilocaea pomi**
- **Botrytis spp.**
- **Fusarium spp.**
- **Verticillium dahliae**
- **Sclerotinia sclerotiorum**

### Asexual fruiting bodies

- **Trees** -- conidiophores
- **Disks** -- acervulus
- **Flasks** -- pycnidia
Conidial life cycle

Anamorphic genera that cause important plant diseases

- Septoria (pycnidium)
- Colletotrichum (acervulus)
- Alternaria (conidiophore)
- Botrytis (conidiophore)
- Verticillium (conidiophore & microsclerotia)
- Fusarium (conidiophore & clamydospore)
**Pycnidium**

Flask-shaped structure bearing conidia -

Typically, during rain, spores ooze out, and are splash dispersed.

**Pycnidia**

Similar to a perithecium but with conidia instead of asci.
Seportia leaf spots
– necrotrophic

Frequently, fungi that produce this type of structure cause “antracnose” diseases

Acervulus
Flat or disk-shaped fruiting body imbedded in plant tissue

Needle-shaped conidia
Pycnidia
Acervuli
Disk shaped structures that produce conidia

Dogwood anthracnose
3rd Type: Conidia on conidiophores

In this group of anamorphs, the conidiophore is stalk- or tree-like

*typical pathogen:* facultative saprophyte

*typical diseases:* molds, vascular wilts, root & crown rots, leaf spots
Alternaria

Early blight of tomato
Gray Mold - *Botrytis*

Gray mold – common rot of many fruits, flowers and vegetables

Neck rot of onion
**Botrytis**
Conidiophore

**Botryotinia**
Teleomorph (apothecium) - very rare in nature

**Verticillium** - vascular wilts

Conidiophore with masses of conidia
Telemorph has not been observed
Microsclerotia of *Verticillium dahliae*

Dutch Elm Disease - another vascular wilt

Bark Beetle vectors fungus from dead elms to healthy elms
Dutch Elm Disease

Synnema (aggregated conidiophore)

The synnema form in beetle galleries in dead elm logs

Fusarium

Three types of asexual spores:
- macroconidia
- microconidia
- clamydospores
Fusarium rots

Some Fusarium spp. produce animal toxins

Dry rot of potato  Ear rot of corn  Head blight of wheat

Storage molds

Aspergillus can produce mycotoxins in stored cereals, nuts, and peanuts
Penicillium causes 'blue and green molds' of stored fruits and vegetables