



## Phylum: Deuteromycota

- Commonly referred to as the *Fungi Imperfecti* or imperfect fungi.
- Classification based on asexual stage because:
  - Sexual reproduction rare, occurs only in narrow environmental parameters.
  - Sexual phase of life cycle no longer exist.

## Phylum: Deuteromycota

- Only asexual reproduction occurs, typically **conidia** borne on **conidiophores**.
- Classified according to conidia color, shape, size and number of septa.
- **Form taxon**: An artificial classification scheme.
- When sexual reproduction discovered, usually an Ascomycota or less often Basidiomycota.

## Phylum: Deuteromycota

- When mycelial septate.
- Thallus also may be yeast or dimorphic.
- When sexual reproduction discovered, usually an Ascomycota or less often Basidiomycota.

## Purpose of Deuteromycota

- Division was erected to accommodate conidia producing fungi with unknown sexual cycle.
- When sexual stage discovered, species would be reclassified according to sexual stage.
- In practice this concept did not work.

## Purpose of Deuteromycota

- Instead, recall example of *Emericella varicolor* (= *Aspergillus varicolor*).
  - *Emericella varicolor*, the sexual stage is the **telomorph**.
  - *Aspergillus varicolor*, the asexual stage is the **anamorph**.
  - Thus, sexual stage is often present.

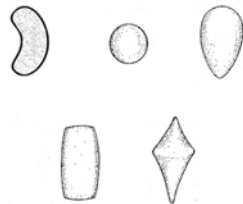
## Defining Taxa in Deuteromycota

- Taxonomy of Deuteromycota based mostly on spore morphology
- **Saccardoan System of spore classification.**
- Oldest system of defining taxa in fungi.
- Artificial means of classification. No longer used in other taxa.

## Saccardoan System of Spore Classification.

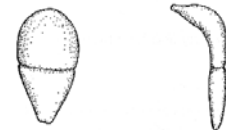
**Amerosporae:** Conidia one celled, sphaerical, ovoid to elongate or short cylindric.

- **Allantosporae:**  
Conidia bean-shaped, hyaline to dark.
- **Hyalosporae:**  
Conidia hyaline
- **Phaeosporae:**  
Conidia dark.



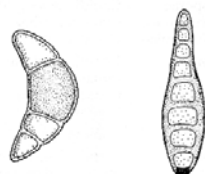
**Didymosporae:** Conidia Ovoid to oblong, one septate

- **Hyalodidymospore:**  
Conidia Hyaline.
- **Phaeodidymospore:**  
Conidia dark.



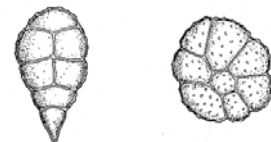
**Phragmosporae:** Conidia oblong, two to many transverse septa

- **Hyalophramospore:**  
Conidia hyaline.
- **Phaeophramospore:**  
Conidia dark.

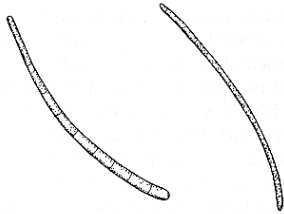


**Dictyosporae:** Conidia ovoid to oblong, transversely and longitudinally septate.

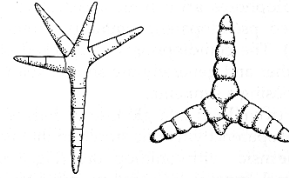
- **Hyalodictyospore:**  
Conidia hyaline.
- **Phaeodictyospore:**  
Conidia dark.



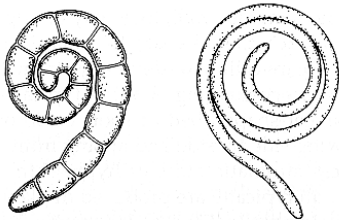
**Scolecosporae:** Conidia threadlike to wormlike, septate or not, hyaline or dark



**Staurosporae:** Conidia stellate, septate or not, hyaline or dark



**Helicosporae:** Conidia helical, septate or not, hyaline or dark



## Classification of Deuteromycota

● We will recognize a single class: **Deuteromycetes**, with four orders:

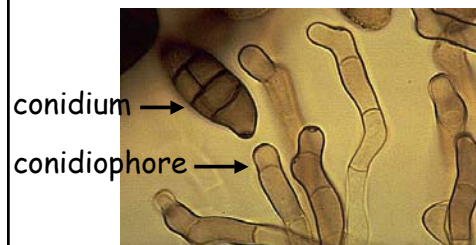
- **Moniliales**
- **Sphaeropsidales**
- **Melanconiales**
- **Mycelia Sterilis**

## Moniliales

- Conidia and conidiophores borne on mycelium.
- Yeast or dimorphic.
- Not produce in pynidium or acervulus.

## Moniliales

● Order: Moniliales (*Alternaria tenuis*)



## Moniliales

- Order: Moniliales (*Alternaria tenuis*)



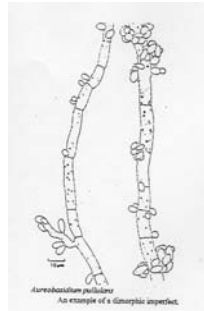
## Moniliales

- Order: Moniliales (*Sporobolomyces*)
- Example of an asexual yeast.



## Moniliales

- Order: Moniliales (*Aureobasidium*)
- An example of a dimorphic genus.
- Conidia bud directly from hyphal cells, and bud off other conidia, i.e. yeast cells.

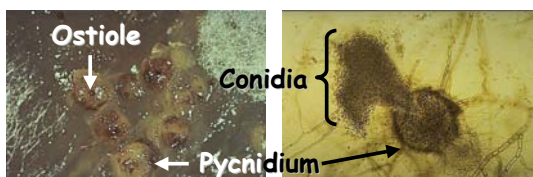


## Sphaeropsidales

- Conidia produced in a **pycnidium** (pl.=**pycnidia**).
- An asexual fruiting body. Variable in shape: globose, flask-shaped, cup-shaped, irregular or stromatic. With ostiole or not.
- Variation like that of ascocarps, but produce conidia and conidiophore.

## Sphaeropsidales

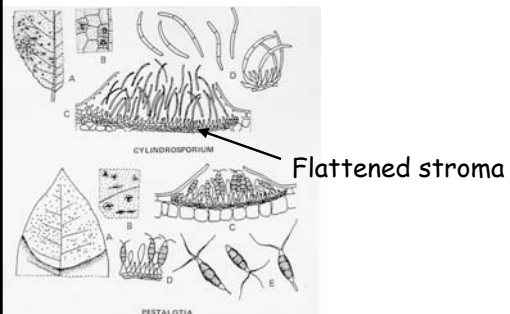
- Pycnidia of *Phoma* on agar.



Pycnidium as seen through microscope.

## Melanconiales

- Two genera of **acervulus** producing fungi:

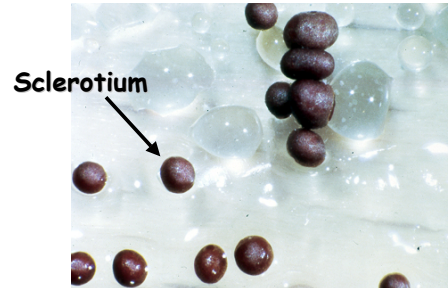


## *Mycelia Sterilia*

- Order in which conidia and conidiophores are not produced.
- Other characteristics are utilized to classify genera.
- Often **sclerotium** stage is present and its morphology is utilized to classify these fungi.

## *Mycelia Sterilia*

- *Sclerotium rolfsii*



## *Mycelia Sterilia*

- *Rhizoctonia solani*



Mycelia characteristic used to define genus

## Genetic Recombination

- Many species are thought to have evolved away sexual reproduction.
  - How is this possible?
  - Shouldn't Deuteromycota become extinct?
  - A means of *genetic recombination* occurs: **The Parasexual Cycle.**

## Genetic Recombination

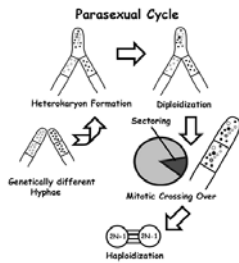
- **Parasexual Cycle:** Mechanism discovered by Pontecorvo and Roper (1952) in septate, mycelial fungi by which genetic recombination is *not* based on sexual reproduction.

## Parasexual Cycle

- Essential features of process:
  - **Heterokaryon formation**
  - **Diploidization**
  - **Mitotic Crossing-over**
  - **Haploidization**

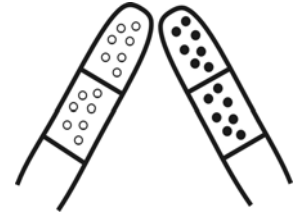
## Parasexual Cycle

- Summary of Parasexual.



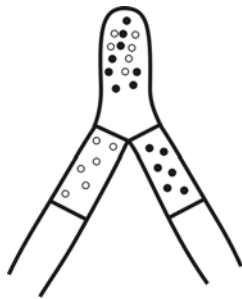
## Parasexual Cycle

- Two hyphae of the same species of fungi that are *genetically different* come into contact.



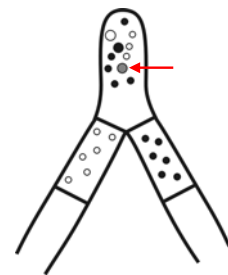
## Parasexual Cycle

- Heterokaryon Formation:** *Plasmogamy of hyphal cells from genetically different individuals.*



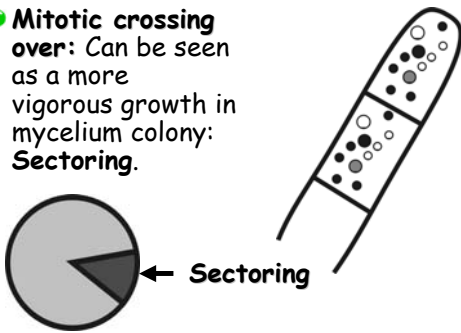
## Parasexual Cycle

- Diploidization:** Formation of diploids from karyogamy of nuclei.
- Heterozygous diploid nuclei provide genetic recombination.**



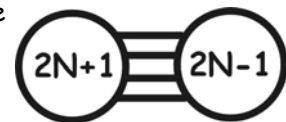
## Parasexual Cycle

- Mitotic crossing over:** Can be seen as a more vigorous growth in mycelium colony: **Sectoring.**



## Parasexual Cycle

- Haplodization:** The gradual reduction of chromosome number to the haploid state.
- Many aneuploids from non-disjunctive mitosis also generated.



## **Parasexual Cycle**

- The frequency of genetically, recombined, haploid nuclei formed was very low.
- Many mycologist feel that this is merely a laboratory phenomenon and does not play an important role in nature.
- How else can we explain the success of the Deuteromycota in nature?