Lecture 8 & 9:-

Subclass 2: Euascomycetidae

General characteristics:-

1- Asci are unitunicate.

2- Producing the cleistothecium, perithecium and apothecium ascocarps.

3- Euascomycetidae have a large number of fungi, so it was divided into three series according to the type of ascocarp.

Series 1: Plectomycetes: producing cleistothecium ascocarp.

Series 2: Pyrenomycetes: Producing perithecium ascocarp.

Series 3: Discomycetes: producing apothecium ascocarp.

Series 1: Plectomycetes:

Order 1: Eurotiales

Some individual are saprobes, others are parasites on animals, plant and human causing many diseases, some causing food spoilage.

Family: Eurotiaceae

Genus 1: ***Aspergillus***

The air everywhere seems to contain the conidia of these organisms. The genus *Aspergillus* contains 200 species and great many varieties. These organisms causing the spoilage of food, texture, and leathers, and some species causing diseases in human such as Aspergillosis which causes by *A. fumigatus*. Symptoms closely resemble those of tuberculosis and it is probable that some doctors mistakenly diagnosed the disease as tuberculosis. Because of their great enzymatic activities, Aspergilli are employed in several industrial processes. Such as production of citric acid and gluconic acid by *A. niger*, production of some enzymes by *A. oryzae* and some species are used to produce

antibiotics, while *A. nidulans* causes nail infection and *A. flavus* is aflatoxin producer.

Somatic structure: The mycelium produces an abundance of conidiophores arise singly from the somatic hyphae, the hyphal foot cell. The conidiophores are long, erect hyphae, each terminating in a bulbous head, the vesicle. As the multinucleate vesicle develops, a large numbers of conidiogenous cells are produced over its entire surface completely covering it. One or two layers of conidiogenous cells (some times termed sterigmata) may be produced, according to the species. The conidium-bearing cells whether primary or secondary are typical phialides. The phialides reach maturity; they begin to form conidia at their tips, one below other in chains Figure 29.

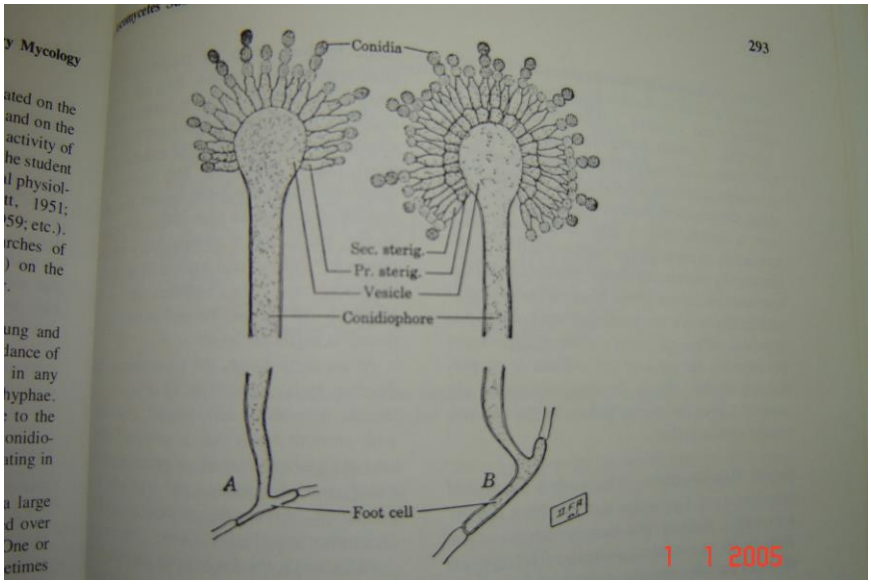

Figure 29: Somatic structure of *Aspergillus*

Sexual reproduction:- The perfect stages of most species of *Aspergillus* have not discovered. And it is likely that such species have lost their ability to reproduce sexually.

Sexual reproduction takes place in several ways and results in at least five different types of ascocarps. The sexual or perfect stage of *Aspergillus* called *Eurotium* or *Emericella*. In *Eurotium* the sex organs, antheridia and ascogonia are produced close to each other on somatic hyphae. Both are multinucleate, elongate structures, often helical, they coil around each other Figure 30.

Figure 30: Sexual stage of Aspergillus (Ascogonium & Antheridium)

Genus 2: *Penicillium:-*

So called green molds and blue molds. We so frequently find on citrus and other fruits, on cheeses in the refrigerator, and other food stuffs. The conidia of *Penicillium*, like those of *Aspergillus*, are everywhere in the air and in the soil. In the biological Lab.,they are as frequent contaminants as *Aspergillus* and *Rhiozpus*.

Various species of *Penicillium* attack and destroy fruits*; P. italicum* and *P. digitatum* are common pathogens of citrus and fruits causing blue mold and green mold respectively. *P. expansum* causes a decay of apples in storage. *P. roqueforti* is responsible highly priced flavor of Roqueforti cheese and *P. camemberti* for of Camembert cheese.

P. notatum or *P. chrysogenum* was used for penicillin production, and *P. griseofulvum* was used for griseofulvin production, which is the best antibiotic effective in control of fungal skin diseases (Dermatomycoses), such as athlete s foot. The sexual stage of *Penicillium* is called *Talaromyces*.

Morphology of *Penicillium*:-

The mycelium produces simple, long, erect conidiophores that branch about two-thirds of the way to the tip, broom-like fashion. The conidiophore, commonly referred to as the brush. The multiple branching of the conidiophore ends in a group of phailides that bear the long conidial chain Figure 31.

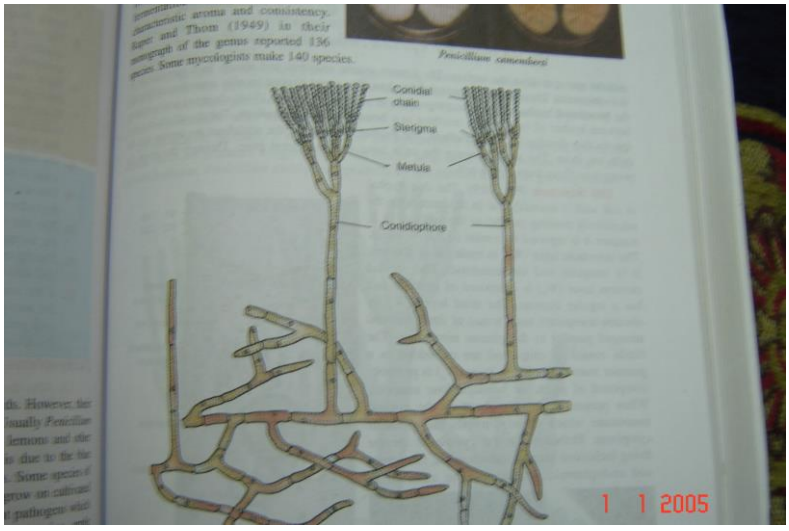

Figure 31: Asexual stage of *Penicillium* (conidial stage)

Series 2: Pyrenomycetes:-

The ascocarp is perithecium, there is only one order which has cleistothecium. Pyrenomyceres divided into five orders:-

Order 1: Erysiphales:- The ascocarp is cleistothecium, but the asci are arranged as hymenial layer.

Order 2: Chaetomyales: The ascocarp is perithecium, surrounding by hairs.

Order 3: Claviceptales: The ascocarp is perithecium type, and the ascospores are filamentous form.

Order 4: Shpaeriales: Perithecium is dark-black in color.

Order 5: Hypocreales: Perithecium is colored.

Order 1: Erysiphales:

These fungi have a completely closed ascocarp (Cleistothecia). And they are obligate parasites causing Powdery mildews. These appear to the unaided eye as a white, powdery coating on the infectious parts**.**

Asexual Reproduction: a few days after the fungus has infected the host, its somatic hyphae produce great numbers of long, hyaline, erect conidiophores. A generative cell at the apex of each conidiophore now begins producing conidia.

Sexual Reproduction: sexual reproduction occurs by antheridium and ascogonium. The result of sexual reproduction is forming the ascocarps which appear white in color at the first time then converted to orange or

red. **The classification of this order depend on the number of asci inside the ascocarp and the type of appendages as follows:**

Genus 1: *Erysiphe*:

- Ther are many asci in ascocarp Figure 32 E.
- The appendages are similar to the hyphae, (mycelioid appendages) Figure 32A .
- Causes P.M. on Graminae.

Genus 2: *Sphaerotheca*:

- There is only one ascus in ascocarp Figure 32 F.
- Mycelioid appendages.
- Causes P. M. on Rose

Genus 3: *Uncinulla:*

- Many asci.
- Hook-shaped appendages Figure 32 B.
- Causes P.M. on Grap.

Genus 4: *Microsphaera*:

- Many asci.
- Dichotomously branched appendages tips Figure 32 C.
- Causes P.M. on Lilac.

Genus 5*: Podosphaera*:

- One ascus.
- Dichotomously branched appendages tips Figure 32 C.
- Causes P.M. on Apple.

Genus 6*: Phyllactinia*

- Many asci.
- Bulbous appendages bases Figure 32 D.
- Cause P.M. on Morus.

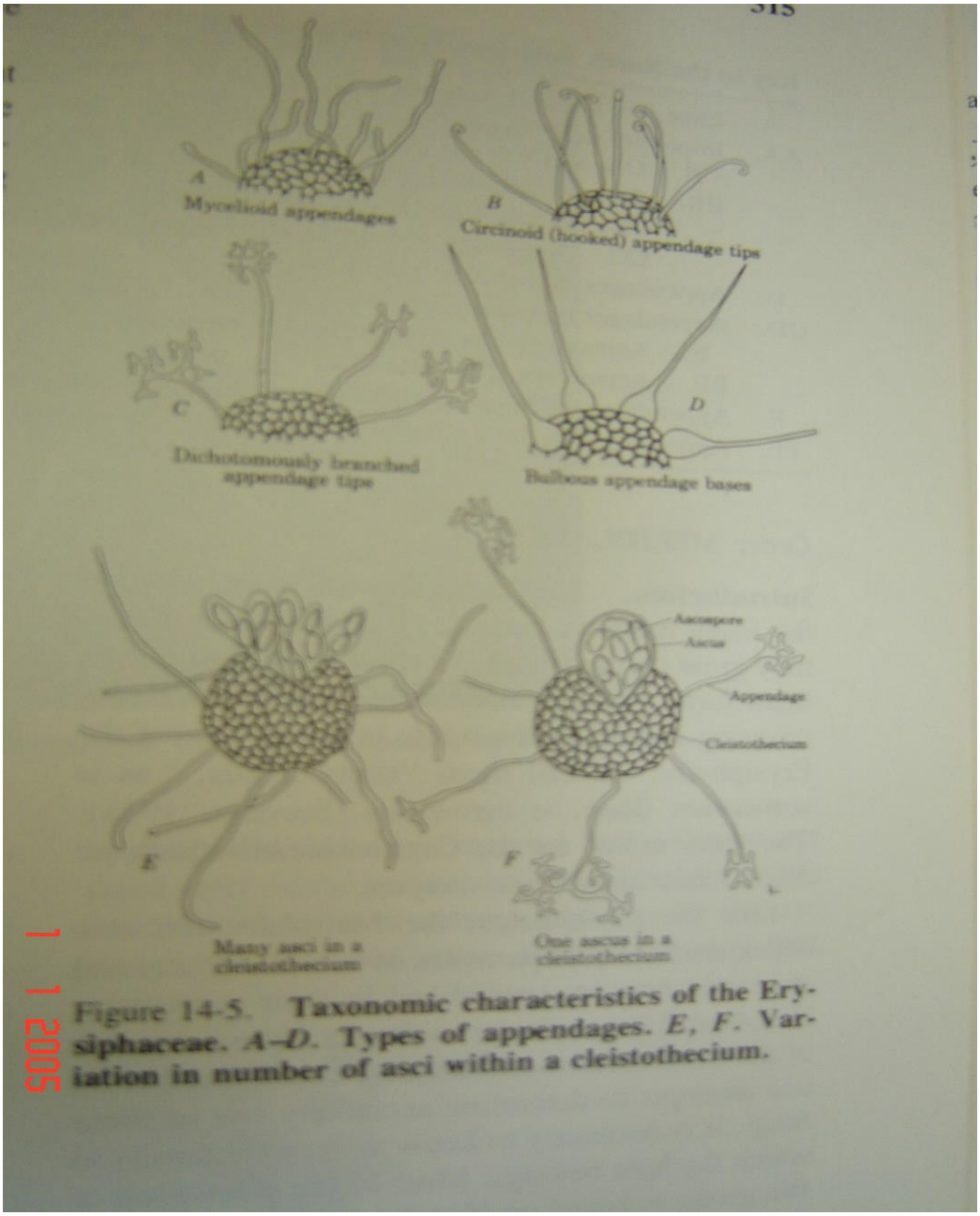

Figure 14-5. Taxonomic characteristics of the Erysiphaceae. *A–D*. Types of appendages. *E*, *F*. Variation in number of asci within a cleistothecium.

Figure 32: Types of appendages of Erysiphaceae

Order 3: Claviceptales

The Claviceptales produce their perithecia with a well- developed, stroma composed entirely of fungal tissue Figure 33 F.

Family: Claviceptaceae

Example*; Claviceps purpurea*

The Life cycle:- *Claviceps purpurea* , the cause of ergot of Rye, will be used as an example of family Claviceptaceae. The thread- like ascospores are discharged from the perithecia in the spring about the time that certain susceptible grasses such as rye are in bloom (K). If the ascospores, which are wind disseminated, happen to reach the flowers of the rye plant or other susceptible host, they germinate (L), send germ tubes into ovary, and cause infection. As the mycelium developed, it destroys the ovary tissues and replaces them in the flower by a soft, white, cottony, mycelial mat that soon becomes covered by acervulus-like layers of short conidiophores bearing minute, oval conidia at their tips (B). These conidia are mixed with a sticky, sweet, nectar-like secretion, the origin of which is obscure. Attracted by this nectar, insects visit the infected ovaries and distribute the conidia to uninfected flowers, spreading the fungus in this way. In the meantime, the mycelium mat, which has produced the conidiophores, continues to develop, and eventually transformed into a hard pink or purplish pseudoparenchymatous sclerotium (E). During the harvesting operations, many sclerotia are knocked off the spikletes, and fall to the ground where they pass the winter. The following spring, the sclerotia germinate and form several long-stalked, mushroom-like, dark purple stromata with globose head. The stromata, which are about three-eights of an inch tall,

are easily visible (F). Within these stromatal heads and just below their surfaces, arise a number of minute cavities surrounded by the pseudoparanchymatous stromatic tissue. Each cavity contains a single, multinucleate ascogonium at the base of which one or more multinucleate antheridia form (G). Plasmogamy takes place between one of the antheridia and the ascogonium, with the male nuclei migrating into female organ (H). While the asci are forming, thin perithecial walls develop around these sexual apparatus within the stromatal heads, producing definite perithecia that open out on the surface of the stroma through a long-neck-like ostiole (I &J). Each mature perithecium bears several elongated, cylindrical asci, each containing eight thread-like ascospores (K). The sclerotia contain a number of poisoning alkaloids are responsible for poisoning animals, including humans. Cattle are often poisoned by grazing on grasses that carry the sclerotia of the fungus or in fields where the sclerotia are lying, having fallen off the plants during harvesting operations. Their legs, hoofs, and tail become gangrenous and cows may abort their calves. This disease of animals is known as ergotism. The sclerotia contain a number of powerful alkaloids such as ergotamine, ergometrin, and ergonovin, which are medically to induce labor and prevent post partum hemorrhage during childbirth.

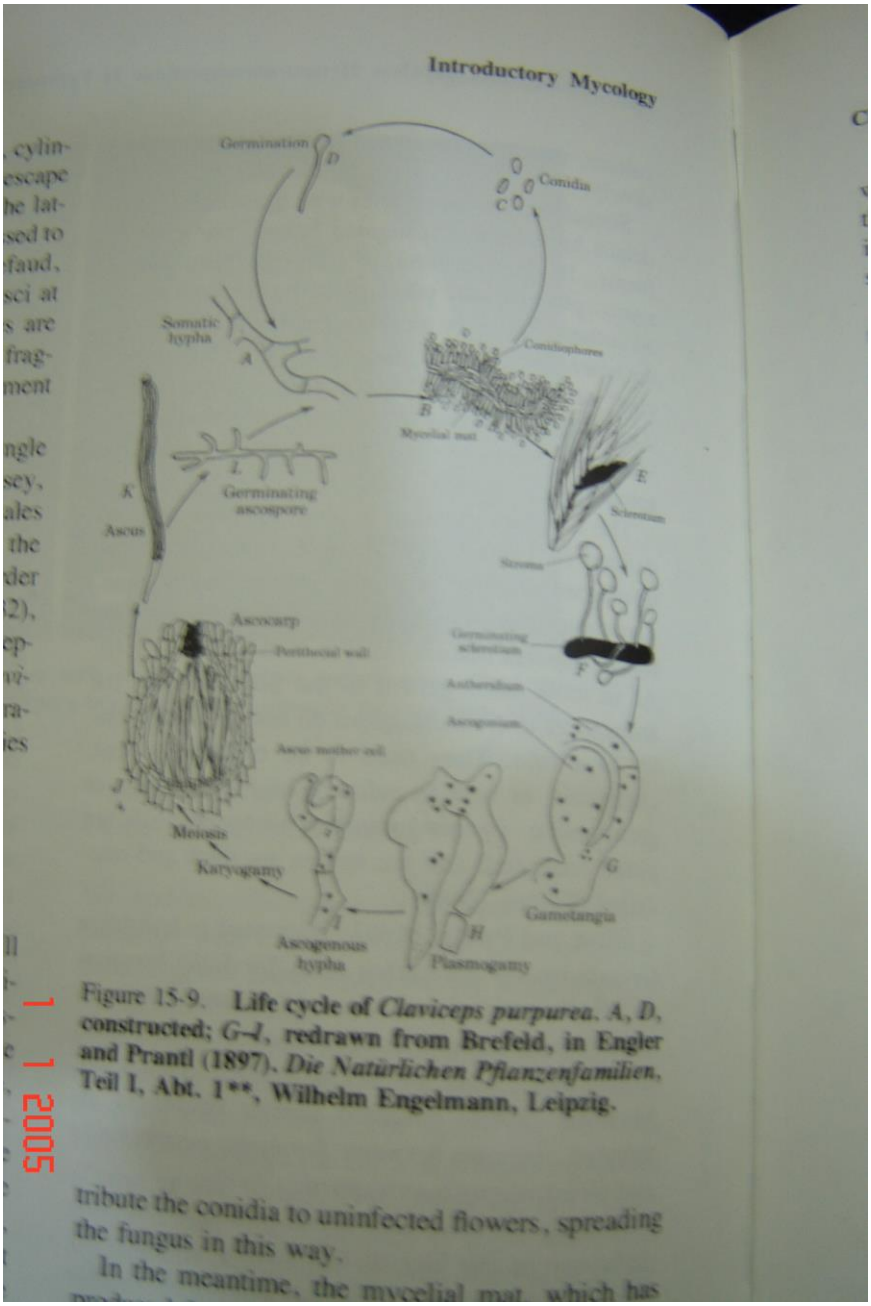

Figure 15-9. **Life cycle of *Claviceps purpurea*. *A*, *D*, constructed; *G–I*, redrawn from Brefeld, in Engler and Prantl (1897). *Die Natürlichen Pflanzenfamilien*, Teil I, Abt. 1**, Wilhelm Engelmann, Leipzig.**

tribute the conidia to uninfected flowers, spreading the fungus in this way.

In the meantime, the mycelial mat, which has

Figure 33: Life cycle of *Claviceps purpurea*