Division: *Ascomycota*

Division *Ascomycota* is the largest fungal division which contains approximately 75% of all described fungi. The division includes 15 class, 68 order, 327 families, 6355 genera and approximately 64000 species. It is a morphologically diverse division which contains organisms from unicellular yeasts to complex cup fungi. Most of its members are terrestrial or parasitic. However, a few have adapted to marine or freshwater environments. Some of them form symbiotic associations with algae to form lichens.

The division members, commonly known as the sac fungi, are characterized by the presence of a reproductive microscopic sexual structure called ascus in which ascospores are formed. Nuclear fusion and meiosis occur in the ascus and one round of mitosis typically follows meiosis to leave eight nuclei. Finally, eight ascospores take place. Ascospores are formed within the ascus by an enveloping membrane system, which packages each nucleus with its adjacent cytoplasm and provides the site for ascospore wall formation.

Another unique character of the division (but not present in all ascomycetes) is the presence of Woronin bodies on each side of the septa separating the hyphal segments which control the septal pores.

Like all fungi, The cell walls of the hyphae of Ascomycota are variably composed of chitin and β-glucans. The mycelia of the division usually consist of septate hyphae. Its septal walls have septal pores which provide cytoplasmic continuity throughout the individual hyphae. Under appropriate conditions, nuclei may also migrate between septal compartments through the septal pores.

Asexual reproduction of *Ascomycota* is responsible for rapid reproduction. It takes places through vegetative reproductive spores called conidia but chlamydospores are also frequently produced. Division members also reproduce asexually through budding and fission. Sexual reproduction of the division leads to the formation of the ascus, It is the

uniting characteristic of the division and it plays an important role of producing sexual spores called ascospores that are involved in sexual reproduction.

Subdivision: *Pezizomycotina*

Pezizomycotina is the largest subdivision of *Ascomycota* with approximately 32,000 species and it contains the filamentous *Ascomycota* members. The subdivision is ecologically diverse with species functioning in ecological processes and symbioses including wood and litter decay, animal and plant pathogens, mycorrhizae, endophytes and lichens, and occurring in aquatic and terrestrial habitats. The major ascus types include operculate, inoperculate, prototunicate, unitunicate and bitunicate, which are based primarily on the number and thickness of functional ascus walls and mechanisms of dehiscence. The Subdivision There are 11 classes (*Orbiliomycetes, Pezizomycetes, Lecanoromycetes, Eurotiomycetes, Geoglossaceae, Lichinomycetes, Leotiomycetes, Sordariomycetes, Laboulbeniomycetes, Dothideomycetes,* and *Arthoniomycetes*) in the subdivision *Pezizomycotina*.

Group: Discomycetes

Discomycetes are an artificial grouping of apothecia-producing fungi in *Ascomycota.*

Class: *Orbiliomycetes*

The class includes the single order, single family, 12 genus and 288 species.

Order: *Orbiliales*

The order has inoperculate ascus and its members are parasitic on nematodes.

Family: *Orbiliaceae*

The family members are widely distributed.but they are more prevalent in temperate regions. Some members are carnivorous and they have specialized mechanisms to trap nematodes (example genus: *Orbilia*).

Class: *Pezizomycetes*

Pezizomycetes members are apothecial fungi with operculate asci. The class includes a single order.

Order: *Pezizales*

Pezizales includes 16 families, 199 genera, and approximately 1700 species. Its members can be saprobic, mycorrhizal, or parasitic on plants and they have importance, such as morels, the black and white truffles, and the desert truffles.

Genus: *Peziza*

Peziza is a saprophytic genus of cup fungi growing on the ground, rotting wood, or dung and it contains about 50 widespread species.

Genus: *Morchella*

Members of the genus have a honeycomb appearance because of the network of ridges with pits composing their cap and it includes about 80 widely distributed species.

Genus: *Helvella*

Helvella is commonly known as elfin saddles and their members are identified by their irregularly shaped caps, fluted stems, and fuzzy undersurfaces. The genus includes approximately 50 species.

Genus: *Tuber*

The tuber is a genus of hypogeous relatives of the cup fungi which evolved a spore dispersal strategy that depends on animals. They are typically found near mycorrhizal roots of woody plants in or near forests, groves,

3. Classis: *Lecanoromycetes*

Lecanoromycetes is the largest class of lichenized fungi that contains 12 order, 77 families, 33 genus and 14200 species.

Classis: *Lichinomycetes*

Lichinomycetes members are lichenized fungi includes the single order *Lichinales*.

Classis: *Leotiomycetes*

The class contains 5 order, 19 families, 641 genus and 5600 species.

Order: *Helotiales*

Helotiales is the largest order of inoperculate Discomycetes. It includes 10 family, 501 genus and 4000 species.

Order: *Erysiphales*

Order *Erysiphales* is represented by 1 family (Erysiphaceae), 16 genera and 873 species The members of the order are widely distributed all over the world and cause diseases on numerous wild and cultivated plants parasitizing about 10 000 species of angiosperms only. As a group, powdery mildews are noted for their virulence, causing great losses to crops on a worldwide basis, as well as for their host specificity. The distribution of the Erysiphales is cosmopolitan, reaching from tropics to the polar areas.

Group: *Plectomycetes*

Plectomycetes is an artificial group of Ascomycota and it originally contained all Ascomycete fungi which produce their asci within a cleistothecium. Plectomycetes can be defined by the following set of characters; Cleistothecium or gymnothecium is usually present, ascogenous hyphae are usually not conspicuous, asci are scattered throughout the cleistothecium, asci are mostly globose and thin-walled, and the ascospores are released passively after disintegration of the ascus wall, not by active discharge, ascospores are small, unicellular and usually spherical or ovoid, conidia are commonly produced from phialides or as arthroconidia.

Class: *Eurotiomycetes*

Most members of the class produce an enclosed structure cleistothecium within which they produce their spores. It contains 10 order, 27 families 280 genus and about 3400 species.

Order: *Onygenales*

Onygenales members are able to digest keratin and because of this have become dominant organisms in environments where keratin is available. The most members have colorless cleistothecia and ascospores. The spherical to egg-shaped asci are always uniformly packed in the centrum and may be dispersed among hyphal elements. The ascospores are always single-celled (example: *Chrysosporium, Microsporum* and *Trichophyton*).

Order: *Eurotiales*

Most members of the order have phialidic asexual stages belonging to the genera *Aspergillus* and *Penicillium* or, less commonly, to Paecilomyces or even simpler types. Rarely there is no anamorph at all. Similar to the *Onygenales* in producing mostly colorless cleistothecia and ascospores. The spherical to egg-shaped asci are always uniformly packed in the centrum and the ascospores are always single-celled (example: *Aspergillus* and *Penicillum*).

Group: Perithecial Ascomycete Fungi

Perithecia differ from apothecia in that they completely enclose the asci, leaving only a small pore, the ostiole, for the escape of the spores.

Class: *Sordariomycetes*

The class includes 28 orders, 90 families, 600 genus and more than 3000 species. It is an anamorph-rich class, with significant diversity represented by hyphomycete and coelomycete species.

Class: *Laboulbeniomycetes*

Members of the class are a unique group of fungi that are apparent external parasites of insects and other arthropods, both terrestrial and aquatic.

Group: Pseudothecial Ascomycete Fungi

Pseudothecium is similar to a perithecium, but the asci are not regularly organized into a hymenium and they are bitunicate, having a double wall that expands when it takes up water and shoots the enclosed spores out suddenly to disperse them.

Class: *Dothideomycetes*

The class contains 11 orders 90 families, 1300 genera and over 19,000 known species.

Group: Lichenized Ascomycete Fungi

Class: *Arthoniomycetes*

The class contains the single order Arthoniales and most of its members are tropical and subtropical lichens.

Subdivision: *Saccharomycotina*

Saccharomycotina includes most of the ascomycete yeasts. Its members reproduce by budding and they do not produce ascocarps.

Subdivision: *Taphrinomycotina*

The subdivision contains four classes (*Schizosaccharomycetes, Pneumocystidiomycetes, Neolectomycetes* ve *Taphrinomycetes*).

Class: *Schizosaccharomycetes*

The class comprises the fission yeasts and it includes single order and family, 2 genera and 5 species.

Class: *Pneumocystidiomycetes*

The class includes single order, family, genus and 5 species and it contains compulsory animal parasite species.

Class: *Neolectomycetes*

The class includes single ordo, family, genus and 3 species.

Class: *Taphrinomycetes*

Taphrinomycetes contains the single order, 2 families, 8 genera and 140 species.

Group: Deuteromycetes (Fungi imperfecti)

Deuteromycetes members do not fit into the commonly established taxonomic classifications of fungi that are based on biological species concepts or morphological characteristics of sexual structures because their sexual form of reproduction has never been observed. There are about 25,000 species which are classified in the deuteromycetes and many are *Ascomycota* or *Basidiomycota* anamorphs.

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