Study Outline Chapter 12

Fungi (pp. 320- 330)

- Mycology is the study of fungi.
- The number of serious fungal infections is increasing.
- Fungi are aerobic or facultatively anaerobic chemoheterotrophs.
- Most fungi are decomposers, and a few are parasites of plants and animals.

Characteristics of Fungi (pp. 321- 325)

- A fungal thallus consists of filaments of cells called hyphae; a mass of hyphae is called a mycelium.
- Yeasts are unicellular fungi. To reproduce, fission yeasts divide symmetrically, whereas budding yeasts divide asymmetrically.
- Buds that do not separate from the mother cell form pseudohyphae.
- Pathogenic dimorphic fungi are yeastlike at 37´C and moldlike at 25´C.
- These spores can be produced asexually: chlamydospores, sporangiospores, and conidiospores (including arthrospores and blastospores).
- Fungi are classified according to the type of sexual spore that they form.
- Sexual spores are usually produced in response to special circumstances, often changes in the environment.
- Fungi can grow in acidic, low-moisture, aerobic environments.
- They are able to metabolize complex carbohydrates.

Medically Important Divisions of Fungi (pp. 325- 326)

- Fungi are placed in the Deuteromycota because sexual spores have not yet been seen.
- The generic name is changed when a fungus is reclassified based on sexual spores. The deuteromycete name is often used for the asexual form and the new name for the sexual form.
- The classification of *Pneumocystis* as a fungus is currently being studied.
- The Zygomycota have coenocytic hyphae and produce sporangiospores and zygospores.
- The Ascomycota have septate hyphae and produce asco- spores and frequently conidiospores.
- Basidiomycota have septate hyphae and produce basidio- spores; some produce conidiospores.

Fungal Diseases (pp. 326- 327)

- Systemic mycoses are fungal infections deep within the body that affect many tissues and organs.
- Subcutaneous mycoses are fungal infections beneath the skin.
- Cutaneous mycoses affect keratin-containing tissues such as hair, nails, and skin.
- Superficial mycoses are localized on hair shafts and super- ficial skin cells.
- Opportunistic mycoses are caused by normal microbiota or fungi that are not usually pathogenic.

- Opportunistic mycoses include mucormycosis, caused by some zygomycetes; aspergillosis, caused by *Aspergillus*; and candidiasis, caused by *Candida*.
- Opportunistic mycoses can infect any tissues. However, they are usually systemic.

Economic Effects of Fungi (pp. 327- 330)

- *Saccharomyces* and *Trichoderma* are used in the production of foods.
- Fungi are used for the biological control of pests.
- Mold spoilage of fruits, grains, and vegetables is more common than bacterial spoilage of these products.
- Many fungi cause diseases in plants (for example, in potatoes, chestnuts, and elms).

Algae (pp. 330- 335)

- Algae are unicellular, filamentous, or multicellular (thallic).
- Most algae live in aquatic environments.

Characteristics of Algae (pp. 331- 332)

- All algae are eucaryotic photoautotrophs.
- The thallus (body) of multicellular algae usually consists of a stipe, a holdfast, and blades.
- Algae reproduce asexually by cell division and fragmentation.
- Many algae reproduce sexually.
- Algae are photoautotrophs that produce oxygen.
- Algae are classified according to their structures and pigments.

Selected Divisions of Algae (pp. 332- 334)

- Brown algae (kelp) may be harvested for algin.
- Red algae grow deeper in the ocean than other algae because their red pigments can absorb the blue light that penetrates to deeper levels.
- Green algae have cellulose and chlorophyll a and b and store starch.
- Diatoms are unicellular and have pectin and silica cell walls; some produce a neurotoxin.
- Multicellular algae include the brown algae, red algae, and green algae.
- Dinoflagellates produce neurotoxins that cause paralytic shellfish poisoning and ciguatera.
- Euglenoids have a semirigid cell membrane and one flagellum; they are unicellular.

Roles of Algae in Nature (p. 335)

- Algae are the primary producers in aquatic food chains.
- Planktonic algae produce most of the molecular oxygen in the EarthÕs atmosphere.
- Petroleum is the fossil remains of planktonic algae.
- Unicellular algae are symbionts in such animals as *Tridacna*.

Lichens (pp. 335- 336)

- A lichen is a mutualistic combination of an alga (or a cyanobacterium) and a fungus.

- The alga photosynthesizes, providing carbohydrates for the lichen; the fungus provides a holdfast.
- Lichens colonize habitats that are unsuitable for either the alga or the fungus alone.
- Lichens may be classified on the basis of morphology as crustose, foliose, or fruticose.
- Lichens are used for their pigments and as air quality indicators.

Slime Molds (pp. 337- 338)

- Cellular slime molds resemble amoebas and ingest bacteria by phagocytosis.
- A plasmodial (acellular) slime mold is a multinucleated mass of protoplasm that engulfs organic debris and bacteria as it moves.

Protozoa (pp. 339- 344)

- Protozoa are unicellular, eucaryotic chemoheterotrophs.
- Protozoa are found in soil and water and as normal microbiota in animals.

Characteristics of Protozoa (p. 339)

- The vegetative form is called a trophozoite.
- Asexual reproduction is by fission, budding, or schizogony.
- Sexual reproduction is by conjugation.
- During ciliate conjugation, two haploid nuclei fuse to produce a zygote.
- Some protozoa can produce a cyst for protection during adverse environmental conditions.
- Protozoa have complex cells with a pellicle, a cytostome, and an anal pore.

Medically Important Phyla of Protozoa (pp. 339- 344)

- *Entamoeba, Naegleria,* and *Acanthamoeba* are parasitic amoeboflagellates that use pseudopods for motility.
- Parasitic amoeboflagellates that use flagella include the following: *Giardia lamblia*, causing an intestinal infection called giardiasis; *Trichomonas vaginalis*, causing genitourinary infections that may be transmitted by sexual intercourse; and trypanosomes, which are found in the blood of human hosts and are transmitted by blood-sucking insects.
- The only ciliate that is a parasite of humans is *Balantidium coli*, the cause of one form of dysentery.
- *Plasmodium* is an apicomplexan that causes malaria.
- Asexual reproduction of *Plasmodium* occurs in red blood cells and the liver of humans.
- Sexual reproduction of *Plasmodium* takes place in the intestine of the female *Anopheles* mosquito.
- *Toxoplasma gondii* is an apicomplexan that infects humans; it can be transmitted to a fetus in utero.
- *Cryptosporidium* causes respiratory and diarrheal diseases in immunosuppressed patients. *Cyclospora* causes diarrheal illness.
- Microsporans cause diarrhea and keratoconjunctivitis in AIDS patients.

Helminths (pp. 344- 350)

- arasitic flatworms belong to the Phylum Platyhelminthes.
- Parasitic roundworms belong to the Phylum Nematoda.

Characteristics of Helminths (pp. 344- 345)

- Helminths are multicellular animals; a few are parasites of humans.
- The anatomy and life cycle of parasitic helminths are modified for parasitism.
- The adult stage of a parasitic helminth is found in the definitive host.
- Each larval stage of a parasitic helminth requires an inter-mediate host.
- Helminths can be monoecious or dioecious.

Platyhelminths (pp. 345- 348)

- Flatworms are dorsoventrally flattened animals; parasitic flatworms may lack a digestive system.
- Adult trematodes, or flukes, have an oral and ventral sucker with which they attach to and feed on host tissue.
- Eggs of trematodes hatch into free-swimming miracidia that enter the first intermediate host; two generations of rediae become cercariae that bore out of the first inetermidaite host and penetrate the second intermidiate host; cercariae encyst as metacercariae in the second intermidiate host; after they are ingested by the definitive host, the metacercariae develop into adults.
- A cestode, or tapeworm, consists of a scolex (head) and proglotidds.
- Humans serve as the definitive host for the beef tapeworm and cattle are the intermediate host.
- Humans serve as the definitive host and can be an intermediate host for the pork tapeworm.
- Humans serve as the intermediate host for *Echinococcus granulosus*; the definitive hosts are dogs, wolves, and foxes.

Nematodes (pp. 348-350)

- Roundworms have a complete digestive system.
- The nematodes that infect humans with their eggs are *Enterobius vermicularis* (pinworm) and *Ascaris lumbricoides*.
- The nematodes that infect humans with their larvae are *Necator americanus* (hookworm), *Trichinella spiralis*, and anisakine worms.

Arthropods as Vectors (pp. 350-353)

- Lointed-legged animals, including ticks and insects, belong to the phylum Arthropoda.
- Arthropods that carry diseases are called vectors.
- Elimination of vectorborne diseases is best done by the control or eradicaiton of the vectors.