**Chapter 22: The Protists**

**22.1 General Biology of Protists**

Protists: domain Eukarya, kingdom Protista and have eukaryotic cells.

The endosymbiotic hypothesis: how mitochondria and chloroplasts eventually became part of the eukaryotic cell. Mitochondria may be derived from aerobic bacteria and chloroplasts from cyanobacteria, which were engulfed by a eukaryotic cell on 2 different occasions.

*Giardia lamblia:* a protest that possesses 2 nuclei but no mitochondria.

**Protist Overview**

* Protists vary in size and most are unicellular
* The amoeboid and ciliates have unique organelles- contractile vacuole that assists in water regulations.
* Protists get nutrients in different ways:
  + Algae(autotrophic) are photosynthetic and gather energy from sunlight
  + Protozoans are heterotrophic, some ingest food by endocytosis, thereby forming a food vacuole.
  + Slime mold (heterotrophic) creeps around the forest ingesting decaying plants in the same manner.
  + Other protozoans and water molds are parasitic and absorb nutrients from their host.
* Asexual reproduction is normal in protists
* Sexual reproduction that requires meiosis and spore formation only occurs in hostile environments.
* Spores are resistant to harsh conditions and some protozoans form cysts, another type of resting stage. In parasites, cyst serves as a means of transfer to a new host.

**Ecological Importance**

* Protists have medical importance and ecological importance
* Being aquatic, photosynthesizers give off oxygen in both fresh and saltwater ecosystems. They are part of plankton
* Plankton: organisms that are in water and serve as food for heterotrophic protists and animals
* Protists enter symbiotic relationships from parasitism to mutualism. Coral reef formation is aided by symbiotic photosynthetic protists.

**Classification of Protists**

* The complexity and diversity of protists make classification difficult
* The variety is so great that taxonomical schemes suggest that they can be split into a dozen kingdoms and 60 phyla

**22.2 Diversity of Protists**

Algae is a diverse group of photosynthetic protists. Botanists once classified algae as plants because both have chlorophyll and carry photosynthesis within a membrane bound plastid, but algae don’t develop an embryo as all plants do.

**The Green Algae**

* 75,000 species are known as the green algae and they live in oceans, freshwaters, snowbanks etc.
* It forms symbiotic relationships with fungi, plants, and animals
* Majority of green algae are unicellular but filamentous and colonial forms exist
* Chlorophyll found in plants is similar to the one in algae

***Chlamydomonas, a unicellular Green algae***

* Actively moving green algae that lives in freshwater pools
* Dates back to a billion years
* Has a definite cell wall, cup shaped chloroplast that contains a *pyrenoid* where starch is synthesized, many species contain a red eye spot that exists on the chloroplast which is sensitive to light and brings organisms out into the light, and a whip like flagella for motion
* Often reproduce asexually, mitosis produces 16 daughter cells in the parent cell wall, it acquires flagella and leaves by digesting the parent cell wall
* Occasionally reproduces sexually when growth conditions are unfavorable, 2 gametes form a zygote and a heavy wall forms around the zygote. It becomes a zygospore that goes into dormancy, when it germinates it produces 4 zoospores by meiosis
* Zoospores: flagellated spores, typical for aquatic species