

Microbial Diversity:
Chapt. 28 – The Origins of Eukaryotic Diversity

PROTISTS

Multiple Kingdoms of Protists within the Domain Eukarya [See Fig. 28.4]

Complex cellular structure – cells with **nucleus** and other **organelles**

Many **membranous organelles**, including **mitochondria**, which are common to all **eukaryotes**, and **chloroplasts** (found only in **photosynthesizers**)

E.g., **cilia & flagella** aid motility; these cytoplasmic extensions are not homologous with **pili** or **flagella** of **prokaryotes**

Nutrition – **Absorption, Photosynthesis, or Ingestion**

Reproduction – mostly **asexual**, but some exchange genetic material

Asexual cell division (mitosis)

Conjugation: exchange of some genetic material across a **cytoplasmic bridge**

Sexual reproduction via the formation and union of **gametes** or other **haploid cells** (requires **meiosis**)

Cysts – resting stages through harsh conditions

Arose from **endosymbiosis** [See Figs. 26.13 & 28.3]

Compelling evidence for Lynn Margulis' theory is found in the genetic material of mitochondria & plastids

Various lineages gave rise to all modern **unicellular & colonial protists**, as well as all **multicellular organisms** (some protists, as well as all plants, fungi, and animals)

Paraphyletic distribution of protists within a tentative phylogeny of Eukarya [See Fig. 28.4]

[THERE IS NO NEED TO MEMORIZE THE DETAILS OF THIS FIGURE, BUT YOU SHOULD UNDERSTAND THE CONCEPTS ABOUT PHYLOGENETIC RELATIONSHIPS THAT IT PORTRAYS]

Hypotheses for the earliest stages of biological diversification:

“Last Universal Common Ancestor”

Common ancestral community of primitive cells

Highly diverse **genetically** and **phenotypically**

“Fungus-like” protists

Heterotrophic – generally via absorption

Some are **decomposers**

E.g., slime molds

Some are **parasitic**

E.g., water molds

“Plant-like” protists

Autotrophic – generally via photosynthesis

Some are **unicellular**

E.g., *Euglena*

Phytoplankton (unicellular algae & cyanobacteria [prokaryotes])
account for ~ 70% of all photosynthesis)

Some are **multicellular**

E.g., Many seaweeds

“Animal-like” protists

Heterotrophic – generally via ingestion

Some are **free-living**

E.g., Some amoebae

Some are **parasitic symbionts**

E.g., Giardia

Some are **mutualistic symbionts**

E.g., protists of termite guts

Exhibit slightly more complex behavior than prokaryotes

E.g., Predator-prey interaction between ciliates:

Didinium preys upon *Paramecium*