

Protists

Paraphyletic: group that doesn't include all descendants of a common ancestor

Monophyletic (the best): group containing all descendants of a common ancestor

Paraphyletic: group containing all individuals with similar characteristics but different ancestors

Kingdom Protista is considered paraphyletic because Archaea and Eukarya are more genetically related with each other than either are with bacteria.

Protists with Modified Mitochondria

Two groups: diplomonads and parabasalids

Diplomonads

Paraphyletic

Parasitic (mainly on animals)

Modified mitochondria (mitosomes)

Ex: Giardia - caused by drinking contaminated water, symptoms include intestinal distress

Parabasalids

Symbionts with animals (parasitic/mutualistic)

Modified mitochondria (hydrogenosomes)

Ex: Trichonympha - mutualist with termites, live within their intestinal tract, breaks down cellulose

Trichonympha vaginilis causes STD in humans

Used to think that these two were related because neither had mitochondria but they both have mitochondria just modified and are no longer used in the same way

Kingdom Euglenozoa - Monophyletic

All have a flagella which is a rod like structure used for locomotion

Two groups - both have flagella but are very different

Euglenoids

Found in pond water

Photosynthetic

Free-living (non parasitic)

Kinetoplastids

Predominantly parasitic

Not photosynthetic

One or two flagella

DNA containing granule: kinetoplastid found in the mitochondria

Causes for some human diseases:

African sleeping sickness (tsetse fly)

Chagas disease (kissing bug)

Kingdom Alveolata - Monophyletic

Every member has alveoli (membrane enclosed cavities that hug the internal surface)

Three groups:

Ciliates

Pond water

Dinoflagellates

Complex form due to the cellulose plates

“Armored” with cellulose plates

Two perpendicular flagella which allows them to whirl around

Abundant in the ocean - plankton

Plankton: small organisms that live near the surface of the water

Zooplankton: non photosynthetic - “animal like” forms

Phytoplankton: photosynthetic - important role in controlling atmospheric CO₂ and heat retention
Responsible for “Red Tides”
(Harmful Algal Blooms)

Results in excess nutrients in the water
(Nitrogen or Phosphorus)

Usually occur in the summer

Economically significant especially with tourism - can't swim during a red tide because of neurotoxins in the water
(possible paralysis)

Could be passed on by shellfish

Neurotoxins in the water kills fish

Apicomplexans

Apical Complex: used for penetration of host cells

Parasitic

Ex: Malaria

Plasmodium causes malaria - kills 600,000 each year

Insect born from mosquitos

Most prevalent in equatorial Africa, South America, and Asia

Kingdom Stramenopila - Monophyletic

Flagella with hair like projections called stramen

Diatoms (Bacillariophyta)

Silica (glass) shells

Photosynthetic

Responsible for 20% of CO₂ fixation

Gold Algae (Chrysophyta)

Gold color

Colonial

Autotrophic or predators

Attack other cells with pseudopodia (cytoplasmic “feet”)

Free living

Potentially result in harmful algal blooms

Water Molds (Oomycota)

Convergent with fungi

Convergent Evolution: independent evolution of similar features in unrelated species - occurs when different species live in similar environments

Heterotrophic → fed by absorption

Cell wall: cellulose

Diploid

Responsible for the Irish Potato Famine - decomposers/parasites that secreted digestive enzymes on the potatoes

Brown Algae (Phaeophyta)

Seaweeds

Kelp forests

Multicellular - tissue differentiation (division of labor)

Plant like

Stipe: stem

Holdfast: roots

Laminae: leaves

Conductive Tissue: cells that can move nutrients around an organism's body

Kingdom Rhodophyta (Red Algae) - Monophyletic

Phycoerythrin - a special photosynthetic pigment that gives the algae its red color - allows it to grow in deeper water - absorb blue/UV light (less competition)

Kingdom Chlorophyta (Green Algae) - Monophyletic

Most closely related to plants - chloroplasts (chlorophyll B - plants and green algae)

Stores carbohydrates as starch

Cell wall (if present) is made from cellulose

Fungi

Absorptive Heterotrophs → secrete digestive enzymes which breaks down food then the fungi absorbs the material that remains

Humans are considered ingestive heterotrophs

Predatory fungi

Ex: Nematode trapping fungi

Characteristics:

Spores (NO GAMETES → NO MALES/FEMALES)

Cell wall: chitin

Ploidy level: usually haploid

Made up of hyphae: long filamentous body form

Mycelium: collection of hyphae → reproductive structure