

Protists

Dinoflagellates

- can be phytoplankton → floating
- have two flagellae
 - one for locomotion (long)
 - one for feeding (create water currents that draw prey to them)
- mixotrophs
- floating, and symbiotic → zooxanthellae in coral, live on or in coral
- many produce toxins → fish kills
 - Pfiesteria*
 - defense against predators and competitors
- red tides
 - bloom when conditions are right (temp, food, etc)
 - toxic
- bioluminescence

Choanoflagellates

- predators
 - feed on other protists (phytoplankton) and prokaryotes
- heterotrophic (external organic carbon sources)
- free-living
- flagellum → locomotion, feeding

Phytophthora infestans

- water molds: oomycetes
 - heterotrophs
 - osmotrophs: release enzymes into environment → break down organic matter (outside of orgs) → external digestion → products of digestion are absorbed across cell membrane
 - freshwater, marine, wet soil habitats
- Great Irish Potato Famine

Algae

- floating: phytoplankton → green algae
- attached to some surface
 - green, red, brown algae
 - often critical component of food webs where they are found

Green algae: Chlorophyta and Charophyta

- attached forms are multicellular
- autotrophs

-*Chara*: substrate/habitat/structure for many orgs; freshwater
Ulva = marine

Brown algae: stramenopila "seaweed"

- marine and autotrophic
- dominant org (food source and structure)
 - holdfast: anchor → attached; NOT nutrient transport
 - gas bladder: provide buoyancy
 - blade/front: where photosynthesis occurs
- some types always submerged (nearshore)
- some are sometimes dewatered (intertidal forms)
- both types provide much structure and food

Kelp forest:

- very much organismal diversity → structure, food source
- polar, temperate oceans
- sea urchins → consume massive quantities of kelp → kelp disappeared
- sea otters → love sea urchins
 - disappeared due to overhunting
 - keystone species: if you remove them, the whole food web collapses

Red algae: Rhodophyta

- red pigment → harvests light energy at deeper depths, can grow here with less competition for space
- deep coral reefs
 - food/structure
 - nori → used in sushi
 - carageenan → food additive → agar plates

Plasmodial Slime Mold

- terrestrial protist
- heterotrophic, feed on fungi/decaying organic matter
- huge → unicellular → multinucleate
 - highly mobile
- sporangia → reproductive structure of PSM
 - each is loaded with thousands of spores
 - launched when sporangium explodes
 - spores spread by wind
 - long-lived → once they sense food, spore moves to food, feeds as an osmotroph
- study of train logistics around Tokyo; each piece of oatmeal represented a city, slime mold represents Tokyo

Cellular Slime Molds

- mobile, terrestrial, heterotrophs

- unicellular, multinucleate
- osmotrophs → release enzymes into environment, break down matter into products of digestion that can be taken up more easily by the org
 - dead organic matter
- model organism (very well studied) → evolution of multicellularity, sociality
- spores - amoeboid → spores aggregate → some spores act as a base → slug stage → sporangiophore → produces spores

Amoeboid Protists

- Rhizopoda (amoebas)
- aquatic, heterotrophs
- highly mobile; using pseudopodia to move, "false feet"
 - can form anywhere on cell
- phagocytosis: using pseudopodia to encase prey → flood vacuole around prey with enzymes used to digest food → products of digestion move into cytoplasm

Actinopodia (amoeboid protist)

- Radiolarian
- marine heterotrophs
 - amoeboid cell is encased in a calcium-based shell secreted by the protist
- feed on bacteria
- fossil radiolarian shells are used to look at past ocean trends
 - diff species have diff tolerances to T, salinity, nutrient conditions
 - similar to diatoms

Foraminifera (amoeboid protist)

- amoeboid body secrete a calcium carbonate shell
- feed on organisms that pass into shell (heterotrophs)
- fossils used for climate reconstruction

Alveolata: Ciliates

- common in all aquatic systems
- recently evolved
 - separate physiological processes → associated with individual organelles
 - anterior/posterior contractile vacuole: excretion, water/ion balance
 - macro/micronucleus: diff nuclei are associated with either reproduction or cell homeostasis
 - cilia: used for locomotion and feeding
- heterotrophs
- some have symbiotic cyanobacteria (+,+)

Health-Related Protists

Diplomonads: *Giardia*