

BACTERIA & PROTISTS

1. KINGDOM MONERA

bacteria - single-cell, no organelles

cyanobacteria - blue-green 'algae'

- photosynthesis but no chloroplasts
- chlorophyll a + phycocyanin
- produced first O₂ in atmosphere

photobacteria - bioluminescent

- in plankton & animal tissues

thermobacteria - chemosynthesis

- convert hydrogen sulfide H₂S
- in hydrothermal vents & hot springs
- base of aphotic food chains

2. KINGDOM PROTISTA

protists - single-cell with organelles

- unicellular plants and animals
- evolved from bacteria
- lead to multicellular organisms

3. UNICELLULAR ANIMALS

protozoans - single-cell animals

- ingestive, marine species never parasitic
- no cell wall or chloroplasts
- pseudopod for locomotion

foraminifera - CaCO₃ shell

- shell chambered & coiled like snail
- ooze forms chalk & limestone

radiolaria - silicate SiO₂ shell

- shell glass-like & spherical with spines

4. UNICELLULAR PLANTS

cells - cell wall & chloroplasts

- reproduce every 24 hours by splitting into 2 cells

dinoflagellates

- pair of flagella optimize position for photosynthesis
- zooxanthellae - symbiotic in animals (sponge, coral)
- red tide - bloom during spring
 - neurotoxin in molluscs during summer
- *Pfiesteria* - attacks flesh/memory

diatoms - dominant unicellular plants

- more complex & in deeper water
- frustule - glass-like SiO₂ cell wall
 - 2 valves fit tight to form pillbox)
- most efficient photosynthesis
- base of most food chain in oceans

5. PLANKTON

plankton - organisms that float in ocean

- most small (jellyfish largest)
- drifts in current or swims weakly
- moves vertically in water column

phytoplankton - unicell plants (esp. diatoms)

- 90-98% marine photosynthesis
- (35% global, produce atmospheric O₂)

zooplankton - unicell & small multicell animals

- includes all different animal groups
- eats bacteria, phytoplankton, & each other
- holoplankton spends entire lifespan in plankton
- meroplankton only larval stage in plankton

6. BIOLUMINESCENCE

light - photons emitted by chemical reaction

- from digestion of lipids, requires O₂
- found in most groups of marine life
- rare among terrestrial organisms

dinoflagellates - to deter herbivores (attracts carnivores)

photobacteria - common in plankton esp. deep water

- also symbiotic in animal tissues

fish - store photobacteria in special organs

- some mid-water fish produce own light
- enhance vision, communication, attract prey/mate, startle predators, counter-illuminate shadows