

## Class 32 PLANKTON

### Phytoplankton

Diatoms, Dinoflagellates, Toxic Algae  
Adaptations of marine "plants"

### Zooplankton

### Bacteria

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**Plankton: Organisms that drift with the current** (Vs. Nekton = swimmers)

Plankton DOES NOT necessarily mean small

- Example: Jellyfish

Some can move a bit, vertically and laterally (somewhat)

**PHYTOPLANKTON** (Phyto = Plant; Greek origin)

- Primary producers of food
  - Photosynthetic (some also heterotrophic)
- Single-celled individuals, mostly
  - Sometimes, large colonies (e.g., Sargassum)
- Reproduction: simple cell division
- Color: photosynthesis pigments (red, brown, green)
- Appendages for flotation (mobility)

Important representatives: Diatoms, Dinoflagellates

#### 1. Diatoms

- Very important producers in some areas
- Many inhabit cold, nutrient-rich waters (polar oceans, upwelling)
  - They "bloom" when sunlight increases in spring
  - ---> rapid growth
- Single cells, or weakly colonial
- Rigid cell wall of silica ( $\text{SiO}_2 \cdot n\text{H}_2\text{O}$ )
- Oily substances inside

#### 2. Dinoflagellates

- Autotrophic, can also be heterotrophic
- Cell wall of cellulose
- Whip-like flagella for migration
- Some species are luminescent -- glow at night
- Toxic algal blooms, e.g., "red tides"
  - Blooms in warm, nutrient-rich coastal waters
  - Toxins incorporated into food chain
  - Harmful to carnivores -- fish, whales, humans (digestive problems, dizziness, respiration problems)

#### 3. Coccolithophores

- Secrete platelets of  $\text{CaCO}_3$  to make spherical shells (coccoliths).
- Some have flagella for limited motion

**Adaptations of Phytoplankton: Survival needs and strategies to meet those needs**

#### 1. Maximum absorption of sunlight

Stay near surface

Maximize surface area

#### 2. Live in nutrient-rich waters if possible

Adapt to cold water (upwelling) or variable salinity (Estuaries)  
Reproduce quickly when nutrients available

### 3. Minimize predation

Toxins produced by some

### Survival Strategies: Phytoplankton (Why so different from land plants?)

- Usually not good to be rooted to the bottom
- No need to build tall plants to compete for sunlight
- Little need for structural support (just float)
- More efficient to exist as single cell organisms

### ZOOPLANKTON: Planktonic Animals

Diverse -- protozoans and others

Nutrition modes:

Herbivores (graze on phytoplankton)

Carnivores (predators)

#### Important representatives of the zooplankton:

**1. Protozoans:** Foraminifera and Radiolarians -warm waters

**2. Crustaceans:** Most numerous and wide-spread multi-cellular zooplankton

Copepods . . relatively small (few mm)

Euphausiids

- e.g., shrimp-like "krill"

- important food source at high latitudes,

...for whales, etc.

...maybe for humans?

### **3. Other representative zooplankton:**

A) Jellyfish, Portuguese man-of-war, Comb jellies

Colonies of distinct organisms that live together and have specialized functions

B) Planktonic snails . . (Pteropods) "foot" has evolved to become a wing-like fin

C) Meroplankton: Planktonic **egg and larval stages** of many nonplanktonic organisms -- molluscs, fish, benthic crustaceans

### Vertical migration of zooplankton (crustaceans, protozoans)

- Rise at night to feed
- Sink during day -> "Deep Scattering Layer" at 500 m, for example
- Must be light-triggered (they descend when full moon rises, they rise during a solar eclipse)

Why? Possible reasons for migration...

1. Evade predators by feeding at night
2. Rest in cooler (denser) deeper waters during day
3. In some areas, subsurface currents return them to coastal upwelling areas

### BACTERIA

Present on every surface in sea water and in sediments

Role in marine ecosystems:

Decompose organic matter

Release nutrient elements - recycled

Act as food resources:

- Planktonic bacteria eaten by zooplankton