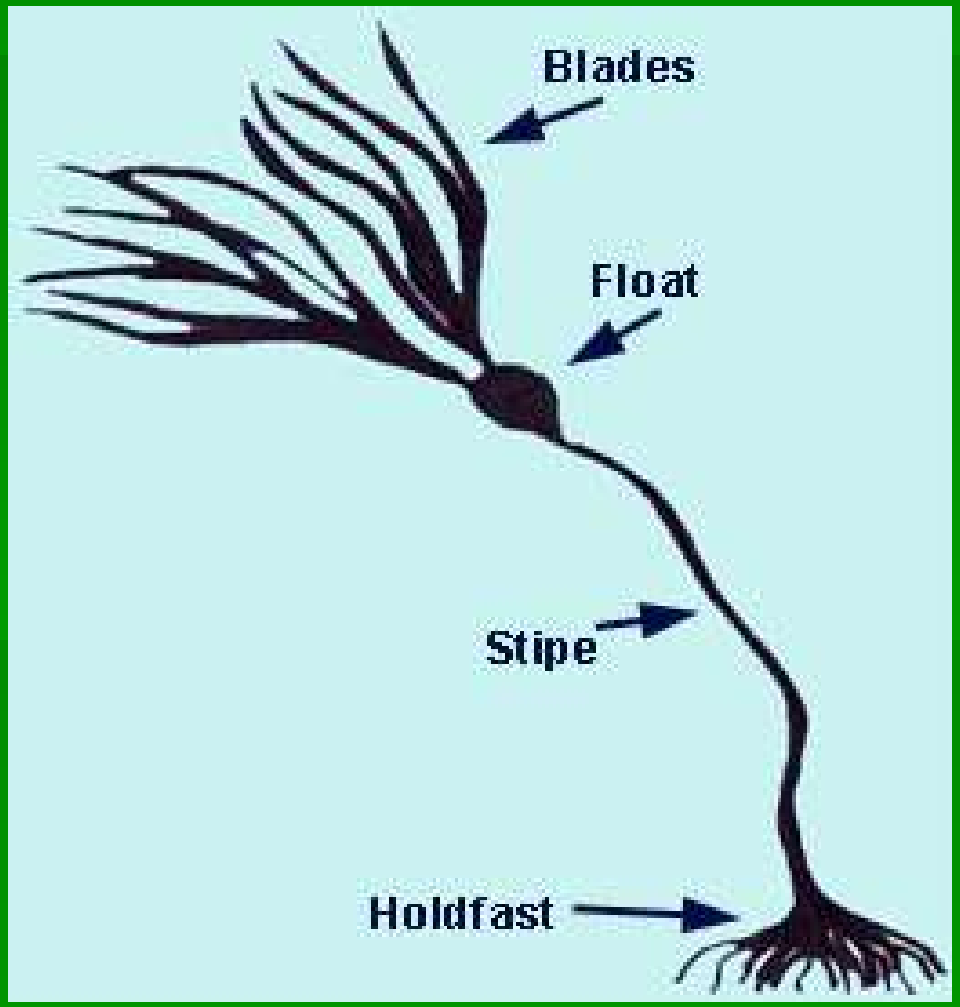
Multicellular Primary Producers: Seaweeds and Plants

Multicellular Algae: The Seaweeds (macrophytes)

- A. General Structure
  - Seaweeds lack true leaves, stems and roots of plants
  - Instead they have……
    - Thallus
      - Complete body
    - Blades
      - Leaf-like (no veins) flattened portions of the thallus
    - Pneumatocysts
      - Gas-filled bladders that keep the blades close to the sea surface.
    - Stipe
      - Location where blades originate from
    - Holdfast
      - Attaches the thallus to the bottom

Float – pneumatocyst

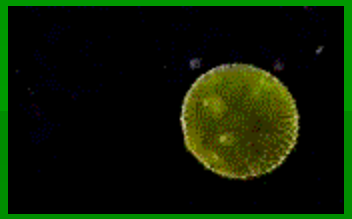


Multicellular Algae: The Seaweeds

- B. Types of Seaweed
  - 1. Green Algae
    - Named for their green chloroplasts
    - Phylum Chlorophyta
    - Only 10% of the estimated 7,000 are marine
    - Very closely related to plants.
      - Contain photosynthetic pigments

Multicellular Algae: The Seaweeds

- B. Types of Seaweed
  - 1. Green Algae (continued)
    - Examples:
      - *Volvox*- colonial green algae shaped like a hollow ball. Contains hundreds and thousands of cells connected by bridges of cytoplasm.



      - *Ulva*- large and complex enough to qualify as seaweeds along with Brown algae.

Multicellular Algae: The Seaweeds

- B. Types of Seaweed
  - 2. Brown Algae
    - Yellow-brown pigments (fucoxanthin) in addition to chlorophyll
    - Phylum Heterokontophyta
    - Most complex seaweeds
    - Grow on rocky shores and must be able to withstand wave action and daily tides

Multicellular Algae: The Seaweeds

- B. Types of Seaweed
  - 2. Brown Algae (continued)
    - Examples:
      - Kelp
        - Anchored to the sea floor by root-like structures called holdfasts (not actual plant roots).
        - Grows fast (up to ½ meter a day)
        - Monterey Bay Aquarium: Kelp Forest Exhibit - Live Kelp Cam

Multicellular Algae: The Seaweeds

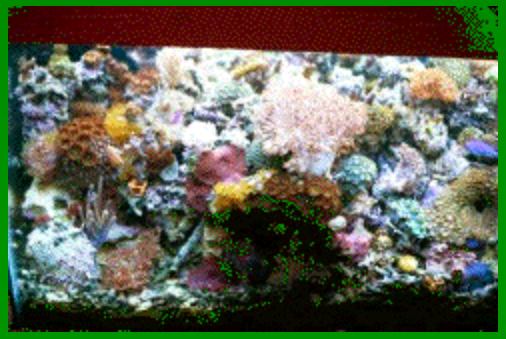
- B. Types of Seaweed
  - 2. Brown Algae (continued)
    - Examples:
      - Rockweed
        - Common on Rocky shores on the Atlantic coasts of temperate North America and Europe

Multicellular Algae: The Seaweeds

- B. Types of Seaweed
  - 3. Red Algae
    - Contain red pigments called **phycobilins**
    - Can live in deep water because they absorb blue and green light (the light that penetrates the deepest).
    - Most are soft bodies, but some are coralline algae (cell walls hardened by mineral deposits).
    - Coralline algae live and contribute to the structure of coral reefs.
    - These algae depend on water currents to bring gametes together.

Multicellular Algae: The Seaweeds

- B. Types of Seaweed
  - 3. Red Algae
    - Examples:
      - Coralline algae
        - Has a thallus that is hard as a result of calcareous deposits contained within the cell walls



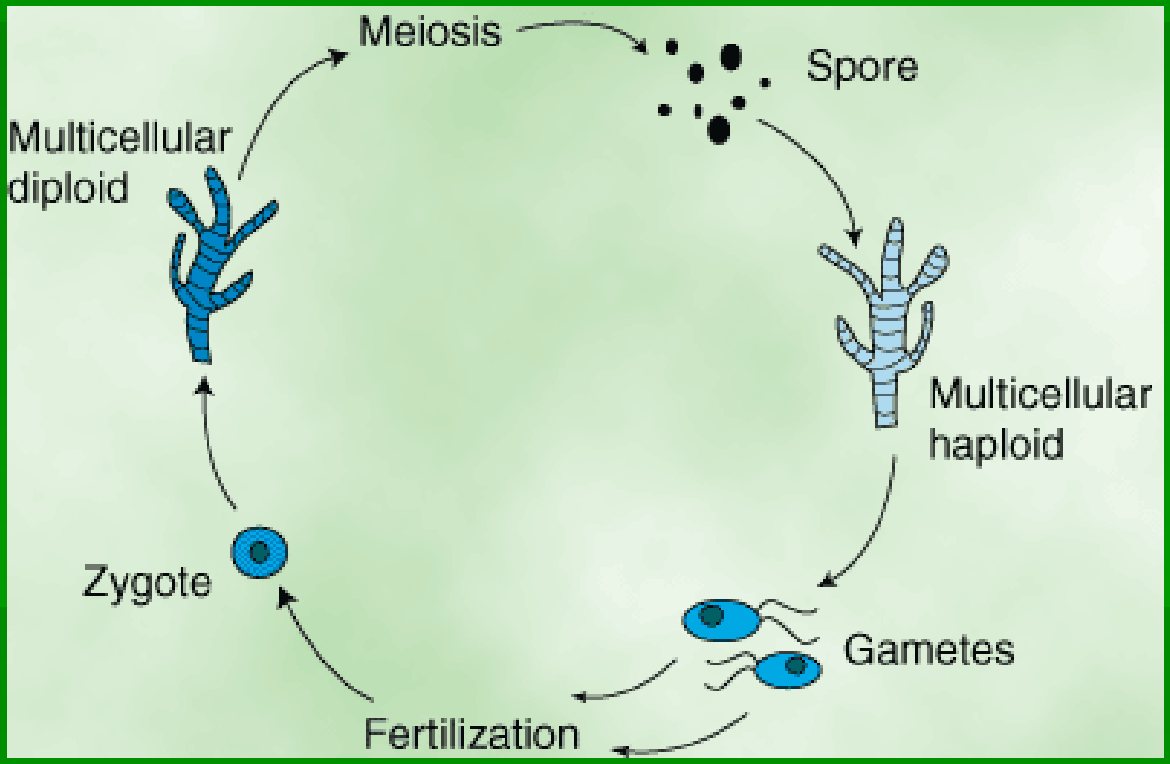
Multicellular Algae: The Seaweeds

- C. Life History
  - Reproduction
    - A. Asexual
      - Fragments of thallus often grow into new individuals
      - **Spores**
        - Cells specialized for dispersal
        - **Zoospores**-spores that have flagella for movement
    - B. Sexual
      - Gametes
        - Gametes from two individuals fuse so that the new generation contains genetic info from both parents
        - Sporophyte-produces haploid spores through meiosis
        - Gametophyte-produces haploid gametes

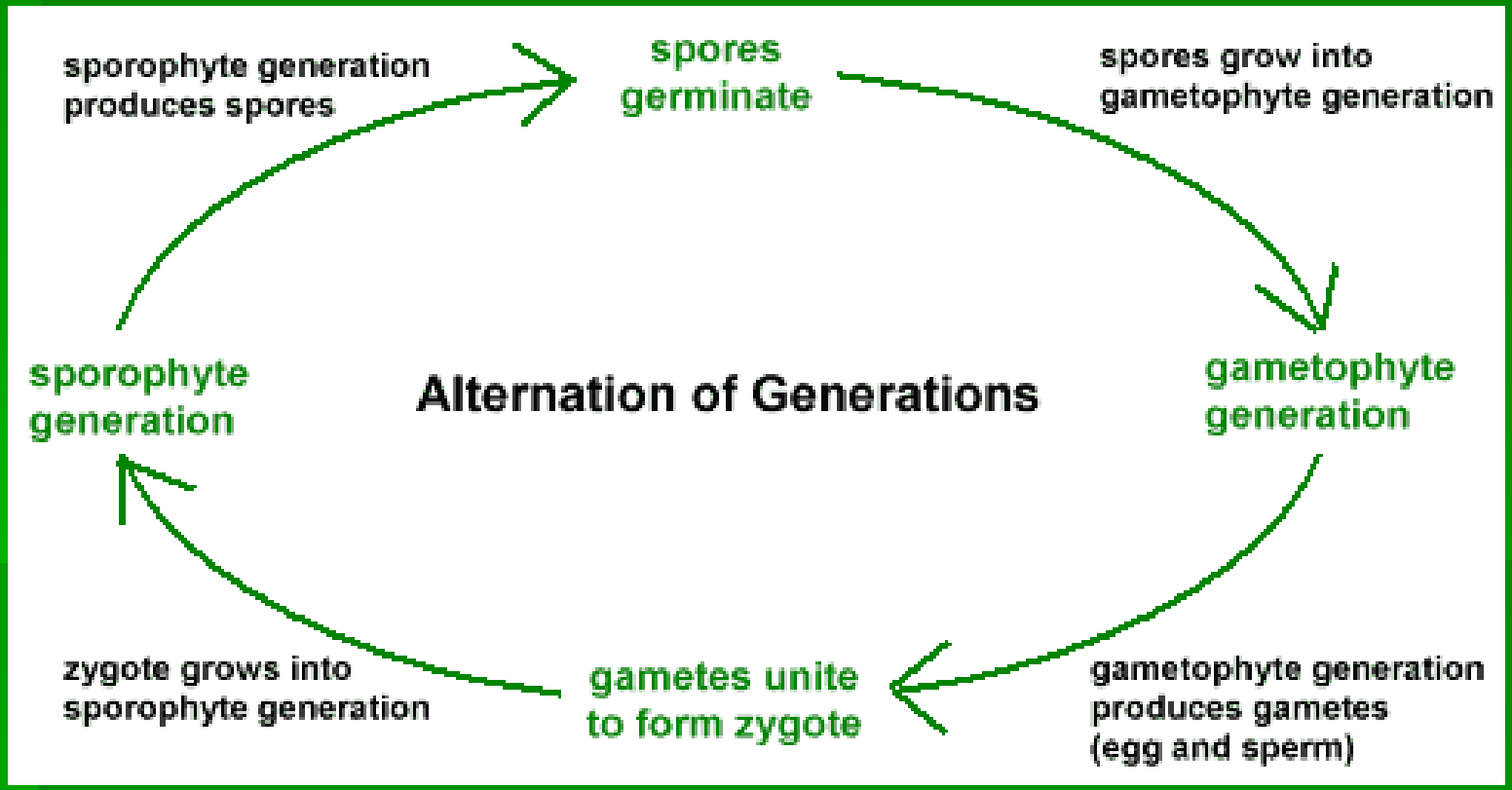
Multicellular Algae: The Seaweeds

- Life History:
  - Get a text book and turn to page107-108
  - Summarize the four types of life cycles demonstrated in Seaweeds
  - Make sure you understand the terminology

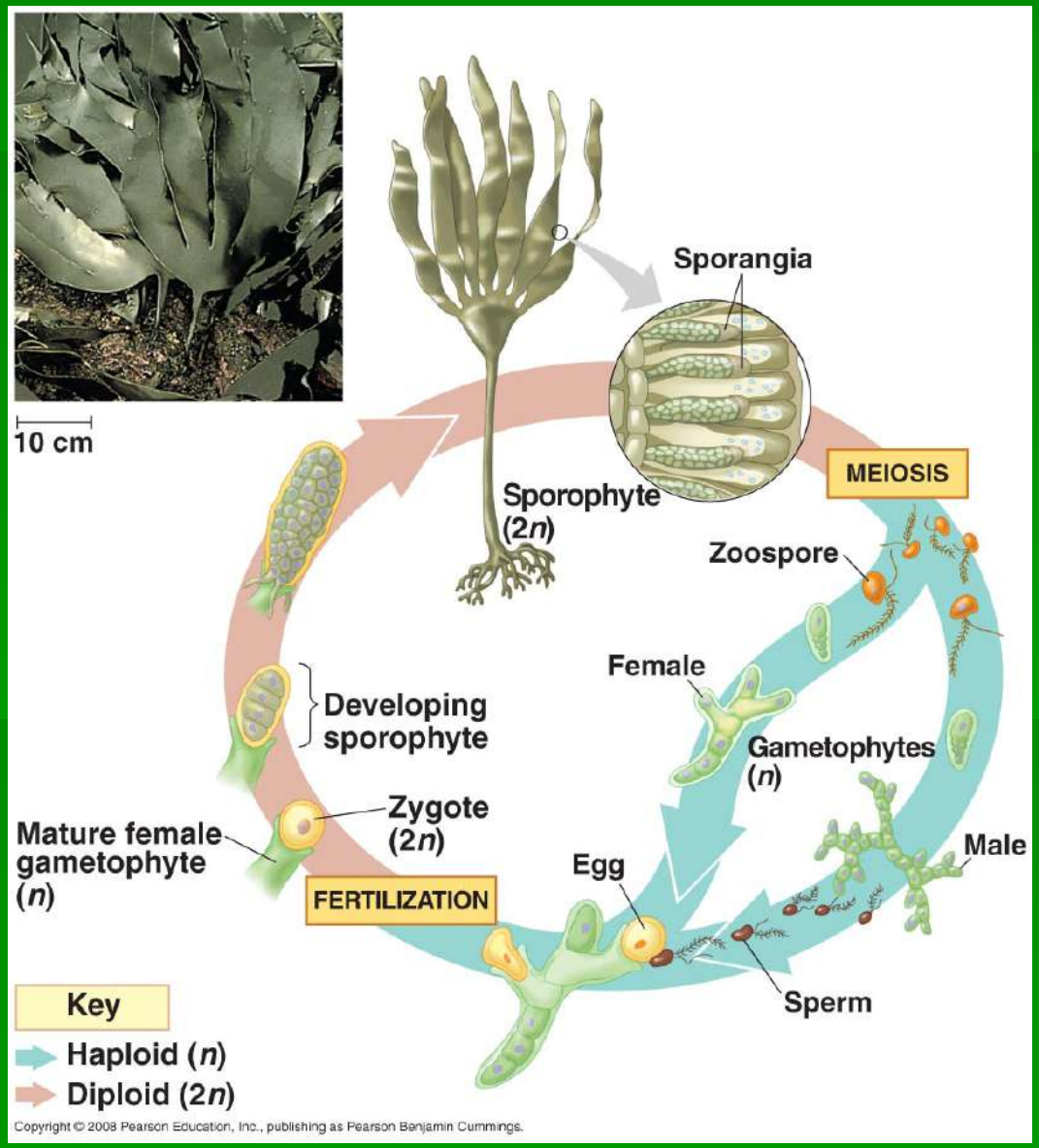
Multicellular Algae: The Seaweeds



Multicellular Algae: The Seaweeds



Multicellular Algae: The Seaweeds



Multicellular Algae: The Seaweeds

- D. Economic Importance
  - Mariculture
    - Farming of seaweeds
    - **Phycocolloids**
      - Chemicals used in food processing and in manufacture of different products
      - Examples:
        - **Algin-**used as stabilizer for ice cream, cheese and toppings. Also prevents frostings from becoming dry. Used in making rubber products, paper, paints and cosmetics.
        - **Carrageenan-**obtained from Red Algae. Used in dairy products and puddings
        - **Agar**-used to protect ham, fish and meats during canning

Multicellular Algae: The Seaweeds

- E. Other Importances
  - Shelter for juvenile fish, sea turtles, and inverts.
  - Food for juvenile fish, sea turtles, and inverts.

Multicellular Algae: The Seaweeds

- Algae Paper
  - At least one page (you can do more)
  - Double spaced
  - Times New Roman
  - Heading is NOT double spaced
  - Find one economic importance of a specific species of seaweed (Food, medicine, ect)

Flowering Plants

Flowering Plants

- Also known as **Angiosperms**
- Have true stems, leaves, and roots
- Few live in ocean (most live near)
- Reproduction involves sporophyte and reproductive organ (flower)

Flowering Plants

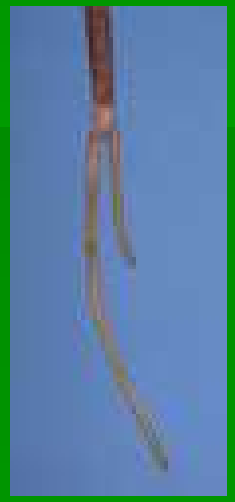
- A. Seagrasses
  - Only true marine flowering plant
  - Evolved from land plants
  - Horizontal stems called rhizomes that grow beneath sediment
  - Flowers very small and inconspicuous (no need to attract insects for pollination)

Flowering Plants

- B. Salt-marsh plants
  - **Halophytes**
    - Salt-tolerant plants
    - Pickle weed
  - **Cordgrasses**
    - Not marine plants, but very salt tolerant
    - Do not tolerate total submergence of water
    - Salt glands in leaves excrete salt

Flowering Plants

- C. Mangroves
  - Trees and shrubs adapted to live along tropical and subtropical shores
  - Feeding and living grounds for many juvenile fishes and invertebrates



Flowering Plants

- C. Mangroves
  - Adaptations
    - Thick leaves to avoid water loss
    - Reproduction – seeds germinate while attached to parent; form seedlings shaped to stick in ground or float to new location.

Flowering Plants

- Examples:
- 1.Red mangrove
  - *Rhizophora mangle*
  - Prop roots


Laguncularia racemosa


Rhizophora mangle


Avicennia germinanus

- 2. White Mangrove
  - *Languncularia racemosa*
- 3. Black Mangrove
  - *Avicennia germinanus*
  - *Salty backside: Salt-excretion*