Coral Reefs

Diverse Animal Communities
Based on Anthozoa
Class Anthozoa

• hard and soft corals, sea anemones, sea fans, sea pansies, sea whips
• Life cycle
  - medusa absent - polyp produces gametes
  - eggs fertilized inside gastrovascular cavity
  - planula disperses
Class Anthozoa

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Anatomy of an Anemone
Hickman Fig. 6-20

- septa divide the gastrovascular cavity
- symmetry of 6 or 8 ... biradial
Anatomy of an Anemone

Hickman Fig. 13-23

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Sea Fan and Sea Whip
compare Hickman Fig. 6-19A

whole colony

individual polyps, magnified
Coral Mutualism

- zooxanthella provides carbohydrates by photosynthesis
  - a kind of dinoflagellate, kingdom Alveolata
  - also help precipitate calcium carbonate for animal’s skeleton
- coral polyp preys upon zooplankton to provide nutrient minerals to the alga
  (many sponges also have algal mutualists)
Algae Live Inside Coral Polyps
compare Hickman Fig. 6-23 - 6-25

mutualistic
Alveolata
Corals Need:

• Warm temperatures
• Plenty of sunlight
• Screening from ultraviolet rays
• Predators do not seem to be permanently damaging
Reefs Develop in Sinking Shallows.
Colonies have many forms.

Calcium carbonate from sea water is deposited beneath growing corals as skeletal support and protection.
Coral reefs

- Coral reefs have great productivity, rivaled only by tropical rainforests.
- Living plants and animals are limited to the top layer above the calcium carbonate deposits.
- Hermatypic corals and coralline algae form most coral reefs: (Fig. 13-28)
- These corals require full salinity of seawater and warmth and light, limiting them to waters between 30 degrees north and south.
- Microscopic zooanthellae are photosynthetic and begin the food chain and recycle phosphorus and wastes.
Types of Reefs
(Fig. 13-34)

1) A fringing reef is near the land with no lagoon or a very narrow lagoon.
2) A barrier reef is parallel to shore with a wide and deep lagoon.
3) Atolls encircle a lagoon and have a steep bank on the seaward slope.
4) Patch or bank reefs are some distance back from any steep slopes.
Florida Keys
Fringing reef
Creature from the black lagoon
Atoll
Reef Anatomy

• The side facing the sea is the reef front or fore reef slope. The reef crest is in shallow water or emergent at the top of the reef front; wave action breaks pieces off. The reef flat toward the shore receives this debris and coralline sand.
Reef anatomy

Figure 13-34
A, Profile of a barrier reef. B, Portion of an atoll from the air. Reef slope plunges into deep water at left (dark blue), lagoon at right.
Coral Reefs Have High Biodiversity

- One reef may have
  - 10 - 100 cnidarian, sponge, and worm species
  - 10 - 100 algae and seaweed species
  - 100 - 1000 mollusk, crustacean, and fish species
About 30% of all fish species live on coral reefs.
Coral Reef Distribution ca. 1970

Climate change and ocean pollution may destroy 40 - 50% of reefs in next 40 years; 93% are already damaged.
Coral Reef Damage
Sources:
Coastal Development
  • Pollution
  • Mining
  • Tourism
  • Coral bleaching
• Over fishing & destructive fishing practices
• Flooding and surface runoff
• Tropical storm damage
• Predator plagues
• Earthquakes
Climate change and ocean pollution may destroy 40-50% of reefs in next 40 years; 93% are already damaged.