Coral Reefs

OCN 201 Biology Lecture 11

Corals - Main reef builders

- **Zoantharia/Hexacorallia** (multiples of 6 tentacles, solitary or colonial)
  - *stony corals (reef building)*, black coral, white coral, zoanthids, anemones
- **Octocorals** (8 tentacles, almost always colonial)
  - Gorgonians, Soft corals, Blue coral

sponges & coralline macroalgae also can be important reef builders & space occupiers
Octocorals
- Gorgonia
- Soft Coral

Hexacorals
- Black Coral
- Stony Corals

Reef-Building Coral Polyp

**Hermatypic:** Reef-builders secrete calcium carbonate skeleton

Have symbiotic *zooxanthellae* (photosynthetic dinoflagellates)

Calyx (or cup)
Symbiosis

- Coral ingests small fish, zooplankton, and supplies nutrients to the symbiont
- Zooxanthellae photosynthesize and provide carbon to the host coral

Zooxanthellae

- Are held in endodermal cells, in a compartment called a symbiosome
- Are genetically and physiologically diverse, with the particular type present related to the environmental regime
Transmission

“Closed” or Vertical Transmission
- Symbiotic Parent
- Symbiotic offspring

“Open” or Horizontal Transmission
- Symbiotic Parent
- Aposymbiotic offspring

more common
Growth

- Polyp secretes calcium carbonate underneath.
- Occasionally will lift up and create a new floor (basal plate), leaving a trapped space.
- Coral growth varies with temperature, light (depth), colony age and size, as well as across species.
- Other processes contribute to growth rate of entire reef system: e.g., physical erosion, growth of multiple species.

Reef-Building Coral Polyp

- Coral growth
Coral bands indicate:

- Age (# bands)
- Growth rate (band width)

**Reproduction**

- Reproduction is frequently by synchronized broadcast fertilization (release of eggs and sperm into water)
- Fertilized eggs develop into larvae
- Many settle quickly, but can stay in plankton for 60 days or more - dispersal by currents
- Settlement is controlled by chemical cues
- Settled larvae develops into polyp and forms colony
Coral Reef Habitat

- Reefs are the foundation of incredibly complex communities
  - more species, more feeding modes, more methods of reproduction, growth, predation, symbiosis, and locomotion than in any other marine ecosystem
- The reef provides structure that shelters diverse creatures and primary productivity that provides food
Coral Reef Distribution

- Found in tropical, nutrient-poor areas
- Where water temperature does not go below 18°C
- Higher diversity at western side of the ocean basins
Reef Types

Fringing Barrier Atoll

Evolution of Island Reefs

Fringing Barrier Atoll

Eventually Atoll Drowns
The Darwin Point

• Volcanic Islands ride the Pacific Plate northward into cooler waters

• Growth rate declines until it can no longer keep up with subsidence

• Critical Point (Darwin Point) is where the reef growth is slower than subsidence
We will come back to anthropogenic impacts on reef ecosystems next week...

Questions?