Benthic Communities

Variety of Environments

- Knowledge largely limited to coastal regions because of access
  - Intertidal
  - Estuaries
  - Coral reefs
  - Subtidal - coastal
- Abyssal environment only recently investigated - limitations and cost
- Each environment has its own set of physical and chemical characteristics and therefore biological

General Environmental Characters

- Variety in coastal environments, little in abyssal (ex. for vents)
- Substrate - rock (solid or rubble), sand, sediments
  - Coastal substrates dependent on land, abyssal substrates dependent on falling debris
  - Characteristics include firmness, texture and stability
- Temperature
- Osmotic nature (salinity, exposure to dehydration)
- Water currents and waves
  - Mouth of river
  - Shoreline exposure
    - Headlands vs. bay
    - Barrier reef or shoal

Size of Substrate Material (graphic)

Faunal Types

- Feeding habits
  - Carnivores, scavengers, suspension feeders (including filter feeders), deposit feeders, grazers
- Size
  - Epifauna - found on hard or firm substrates
  - Infauna - found in softer substrates
    - Macrofauna - typically feed on substrate (deposit feeders) or passing debris (filter feeders)
    - Microfauna
    - Interstitial (meiofauna)

Dispersal

- 75% have of coastal benthic animals have mobile larval forms (meroplankton) for 2-4 wks- important for lifetime of substrate existence
- Biology of larval forms very different than adults
- Settling is very important activity

Reproductive Strategies

- Fecundity (# of eggs or offspring produced) vs. mortality
- Timing - seasonal or lunar vs opportunistic
- Rearing - none vs. brooding

Intertidal Environment

- Or littoral
- Periods of emersion and immersion (including spring and neap tides)
- Variation plays important role of distribution (zonation) due to exposure to changing elements
  - Dehydration (desiccation)
  - Rainfall or high salinity
  - Temperature - high or low (freezing)
  - Predation (including by terrestrial animals)
  - Access to nutrient supply and oxygen
  - Wave action
  - Shifting sediments
- Interactions between species also plays role in zonation (particularly at lower limite of range of distribution)
  - Predation
  - Competition for food and space
  - Caging and removal experiments

Prevention of Dessication

- Depression
- Grouping
- Operculum

Opihi (graphic)
Deflection of Wave Force (graphic)
Other Rocky Intertidal Residents (graphic)
Sand Beach Environment

- Unstable substrate moving with waves, tides and currents
- Grain size important
  - Water retention (drainage)
  - Size of interstitial space
  - Detritus accumulation
  - Oxygen levels (anoxic - hydrogen sulfide)
- Burrowing (digging, boring, consuming)
- Detritus or suspension (filter) feeders
- Zonation not as discrete as rocky shorelines

Effect of Substrate Size (graphic)
Ghost Crab (graphic)

Mole Crab (Sand Turtle) (graphic)