

Class 37

BENTHIC COMMUNITIES

- Intro: great diversity
- Intertidal, rocky coasts
- Mud and sand bottoms
- Deep-sea
- Hot-spring vents

INTRODUCTION

Greatly varied benthic habitat -- supratidal "splash zone" to deep ocean basin.

Environmental demands depend on:

1. Characteristics of seafloor and overlying water
2. Conditions established by other members of the community

Vast majority of animals species in oceans are benthic. Diversity related to wide range of conditions on sea floor:

1. Varied availability of food
2. Nature of seafloor (sediments vs. rocks, etc.)
3. Variations in T, S, turbulence, exposure

Epifaunal habitat: suspension feeders = filter-feeders
some move around, some stay in place

Infaunal habitat: deposit feeders + filter-feeders

ROCKY SHORES

General characteristics:

- Highly variable physical conditions (T, S, waves, tides, exposure)
- Diverse and often productive communities
- Distinct depth zonation (especially for epifaunal animals and plants) reflect different environmental stresses

Supratidal: Typical inhabitants (adapted to rough, occasionally dry conditions)

- Lichens, small (green) algae
- Herbivorous snails and clams
- Filter-feeding barnacles
- Note all animals have shells, mostly to keep from drying out

Intertidal zone

- Large T & S variations (daily and seasonal)
- Highly specialized communities
- Intertidal inhabitants
 - Attached brown algae
 - Herbivorous limpets and chitons
 - Filter-feeding clams and other molluscs

Subtidal inhabitants

- Variety of attached, large algae (e.g., kelp)
- Herbivorous sea urchins
- Molluscs
- Predatory sea anemones and starfish

SEDIMENT COVERED (MUD AND SAND) BOTTOMS

Sediment bottom is unstable

--> Few large, attached plants

--> Therefore, few grazing animals

BUT animals can hide inside sediment (infaunal)

Organic matter from algae and imported from other environments- variable amounts:

- Sand beaches -- "clean;" sparse organic matter in sediments
- Mud flats - - more protected environments

-less turbulent water

-finer sediment grain size

-higher accumulation of organic matter

-anaerobic (O_2 -free) conditions may exist at depth

possible bacterial reduction of sulfate to H_2S

-Animals that utilize degraded plant material in water or in sediment

are dominant -- Deposit/detritus-feeders; filter feeders

Some predators, too- less common

Epifaunal deposit-feeders: Sand dollar, sea pen, some crustaceans

Epifaunal predators: Snails, starfish, some crustaceans

Infaunal deposit-feeders: Sea cucumber (related to star fish)

Infaunal filter-feeders: Clams, cockles, some worms

DEEP-SEA BOTTOM

Environmental characteristics:

- Uniform water conditions (cold!), dark
- Fine-grained sediments
- Limited supply of organic matter

Home for less than 1% of life in the sea

Deposit-feeding infaunal organisms are dominant:

- worms
- burrowing crustaceans
- sea cucumbers

Their activity causes mixing of upper layers of sediment (called bioturbation)

Lack of bioturbation, though rare, allows very fine layering, maybe annual layers, that can be studied to reconstruct past conditions on earth

Suspension feeders and epifaunal scavenger-predators are common but less abundant (fish, starfish, crustaceans)

HYDROTHERMAL VENT COMMUNITIES OF THE DEEP-SEA FLOOR

Food-producing autotrophs are chemosynthetic bacteria (not plants)

Bacteria support diverse and exotic benthic communities:

- crustaceans, clams, molluscs, fish
- enormous tube worms with red flesh