

Student Notes- Oceanography
Marine Biology

Name _____
 Date _____

Vocabulary: Please number and define each term below in a complete sentence on a separate sheet of paper.

plankton	phytoplankton	zooplankton
nekton	algae	diatoms
foraminiferans	crustaceans	copepods
krill	mollusks	ctenophores
coelenterates	vertebrates	invertebrates
pinnipeds		

Oceanic Environment and Production

A. Environmental Zones

1. Pelagic Zone- water environment
 - a. _____ - pelagic zone above the continental shelf
 - b. _____ - deep water away from the influence of land, further divided into the photic and aphotic zone (without sunlight)
2. Benthic Zone- Seafloor environment (subdivided by depth)
 - a. _____ - between high and low tide
 - b. _____ - below low water

B. Life and the Marine Environment

1. _____ - marine organisms don't require structural strength as on land
2. Floating organisms store their food reserves as oil droplets that enable them to float (whales and seals store fat in form of _____)
3. Fish need to stay hydrated in salt water by _____ (by drinking sea water and excreting through gills)
 - a. Salmon can move between low salinity to very high salinity
4. _____ - produced by the interaction of the compound luciferin and the enzyme luciferase (Jellyfish and deep water fish use it lure prey)

C. Primary Production

1. Plankton- plantlike organisms and animals that float with the _____
 - a. _____ - unicellular organism that relies on photosynthesis, rely on sunlight and nutrient are required to maintain phytoplankton populations
 - b. In areas of upwelling primary productivity (population of phytoplankton and their predators) is highest

D. Food Chains, Food Webs and Trophic Levels

1. Food Chain- primary productivity forms the first link that connects plants and animals
 - a. _____ - eat plants directly
 - b. _____ - feed on herbivores or other carnivores
 - 1) Most numerous herbivores are zooplankton (primary consumers)
2. _____ - show complex interrelationships among organisms and what they are fed on
3. _____ - food web relationships are simplified and are demonstrated in a food pyramid
 - a. Example: Antarctic food web, fish, seals, whales, and birds has its base in krill (shrimp-like 2 inches long)
 - b. <http://video.nationalgeographic.com/video/specials/nat-geo-live-specials/selbe-oceans-lecture-nglive/>

E. Chemosynthetic Communities

1. In 1977, an expedition into deep water (8500 feet) around hydrothermal vents at the _____ discovered animals living in water temperatures above 230 degrees F.

- a. Animals include clams, mussels, barnacles, fish and tubeworms (fastest growing marine invertebrate (grow 3.3 feet per year)
- b. Depend on bacteria for primary productivity which use _____ - feed on hydrogen sulfide near hot vents
- c. 95% of the nearly 300 species found at these vents are new humans

Life in the Water

A. Classification of Organisms

1. Plankton- float or drift near the surface
2. _____ - organisms live attached to the sea floor
3. _____ - animals that swim freely and purposefully in the sea

B. Plankton

1. Phytoplankton are known as algae, include seaweed and unicellular organisms
 - a. Examples: Diatoms, found in cold nutrient-rich water
 - b. _____, use photosynthesis and ingest other organisms

C. Zooplankton

1. Either herbivores or carnivores, have some ability to swim in pursuit of prey
2. _____ and radiolarians are single celled and found in warmer waters after they die their bodies are a major contributor to ocean bottom sediments
3. Crustaceans (shrimplike): copepods and _____, make up 60% of zooplankton in any of the oceans
 - a. Euphausiids- Arctic and Antarctic Oceans= Krill, the main food for baleen whales
4. _____, modified mollusks- swimming snails
5. Ctenophores, comb jellies use tentacles feed on other zooplankton
6. _____ (coelenterates), true jellyfish, spend entire lives as drifters
 - a. Some cnidaria live in colonies- _____
7. _____ - juvenile forms of oysters, clams, barnacles, crabs, worms, snails, starfish, fish and many other organisms are considered zooplankton

D. Bacteria

1. Microscopic, most numerous (100 million in every liter of salt water)
2. Play an important role in breaking down _____ and serve as a major protein source

E. Nekton

1. Approximately 5000 species swim freely in the pelagic and neritic regions of the oceans
2. Invertebrate: only a few species of squid and shrimp
 - a. Squid- range in size from a few cm up to possibly 90 feet long! They swim rapidly are very efficient predators
3. Vertebrate
 - a. Fish are dominant in species numbers, found at all depths but mainly _____, shallow coastal areas and estuaries
 - b. Sharks and Rays
 - 1) Sharks teeth are _____, excellent senses (even have their own compass)
 - 2) Approximately 300 species, ranging in size to a few cm up to 50 feet (whale shark)
 - 3) Play an important role as predators and scavengers in food web
 - 4) Rays are mainly carnivorous but the Manta Ray eats only plankton
 - 5) All sharks and rays produce _____
 - c. Bony Fish
 - 1) Travel in schools as a means of protection, less of a chance to be eaten
 - 2) Herring-type fish- sardines, _____, menhaden and herring
 - 3) Open water fish- swordfish, tuna, _____
 - 4) Bottom swimmers- flounder, halibut, and turbot

- 5) Perch and snapper tend to be rock fish living near a reef or jetty
- 6) Deep water fish tend to be 2-30 cm in length such as Angler fish _____

d. Mammals

- 1) Marine mammals are warm-blooded air breathers, young are born alive
- 2) _____ - whales, either toothed (Sperm whale, Killer whale, porpoises and dolphins) or strainers of baleen (filter feeders) feed on krill
 - a) Due to whaling by the 20th century some species were down to only 4% of their original population
- 3) _____ ('feather-footed'), seals, sea lions, sea otters, spend some time on land
- 4) _____ (slow moving), manatees, sea cows, are only herbivorous marine mammals

e. Reptiles

- 1) Saltwater crocodiles are found in Australian estuaries
- 2) _____ of the Galapagos Islands evolved a flattened tail for swimming
- 3) Fifty species of sea snakes in the Pacific and Indian Oceans, extremely poisonous
- 4) _____: green, hawksbill, leatherback and loggerhead can weigh over 300 lbs.
- 5) Many reptiles are migratory for nesting purposes on dry land

f. Marine Birds

- 1) 3% of 8600 species are consider marine, all have to nest on land
- 2) _____ (flightless but fast swimmers- 10 mph), pelicans, gulls and terns