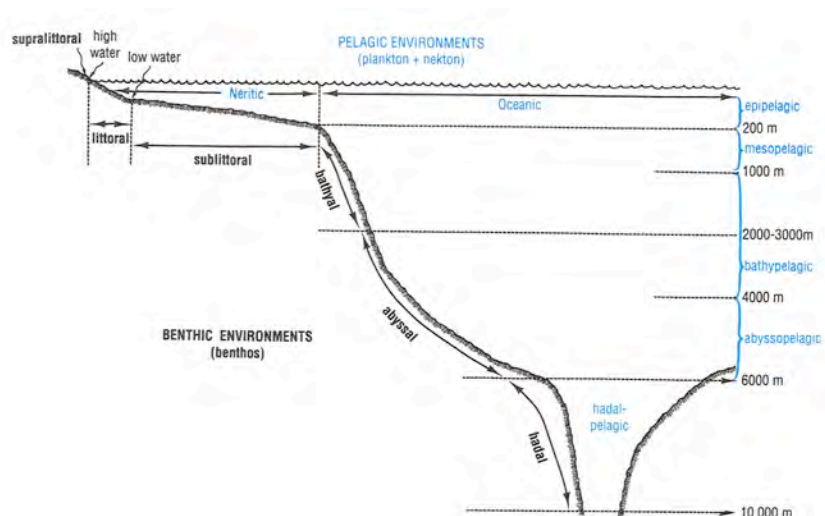


Pelagic habitats and organisms

Reading:
Miller, Ch. 6, 11

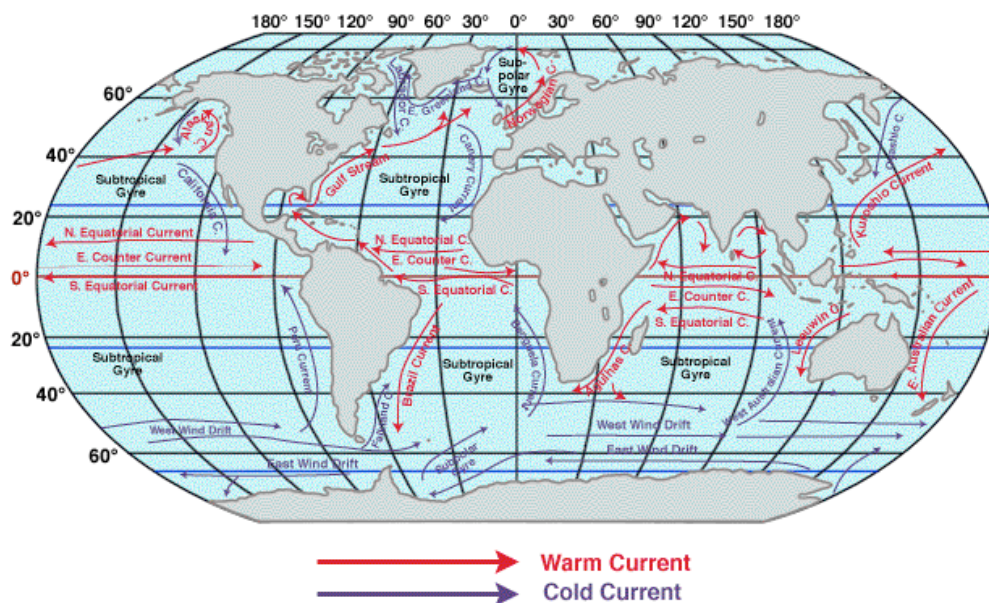
Marine Habitats



Nature of the pelagic environment

- Homogeneous, lack of topography
 - No place to hide
- Circulation
 - Movement of water parcels affects access to resources, adaptation to environmental parameters

Ocean Currents



Dispersal and return

- For plankton, water movements aid in dispersal
- Unless there is at least occasional return to close the cycle, the geographic distribution will not be sustainable

The vertical dimension

- Drastic variation with depth
 - Biomass
 - Light
 - Temperature
 - Pressure
- Many deep pelagic animals have epipelagic larvae that must make major physiological changes during metamorphosis

Epipelagic Zooplankton

- Census of Marine Life
 - The Census of Marine Life is a global network of researchers in more than 80 nations engaged in a 10-year scientific initiative to assess and explain the diversity, distribution, and abundance of life in the oceans. <http://www.coml.org/>
 - Census of Marine Zooplankton (CMarZ)
 - <http://www.cmarz.org/galleries.html>
 - Visit the photo galleries for some amazing sights. Unfortunately location, depth and size scale don't accompany the images. Most images in this lecture are from this site.

Crustaceans

- Copepods
 - There are more copepods than any other kind of zooplankton
 - 1 mm - a few mm
 - Calanoid copepods dominant in plankton
 - Swim using first pair of antennae
 - Eat phytoplankton and small zooplankton
 - Feeding is selective



Paraeucalanus attenuatus



Euchirella sp.



Lucicutia aurita a bathypelagic
(deep dwelling, >1000m)
Copepod



Haloptilus sp.

Crustaceans

- Euphausiids (Euphausiidae)
 - Shrimplike, cm size
 - Eat phytoplankton and smaller zooplankton
 - Main food of baleen whales
 - Almost all are bioluminescent



Thysanopoda obtusifrons

Protozoans

- Forams
 - Calcium carbonate skeleton
- Radiolarians
 - Silica skeleton
- Both
 - Submillimeter to millimeter size
 - Pseudopodia capture phytoplankton and bacteria
 - Often have algal symbionts



The planktonic foraminifer
Hastigerina pelagica

http://www.usc.edu/dept/LAS/biosci/Caron_lab/



radiolarian

Jellies

- Ctenophores
- Cnidarians
 - Scyphozoans (medusa)
 - Siphonophores



Ctenophore (comb jelly)



Photo by Kevin Raskoff

Cnidarian - medusa

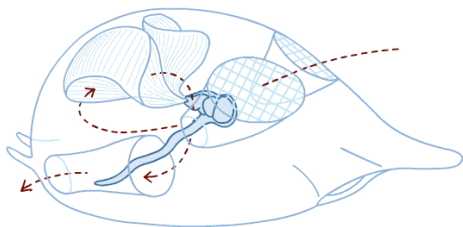


Cnidarian - siphonophore

Jellies

Urochordates - filter feeders

- Salps
- Larvaceans
 - [larvacean in house](#)
- Pyrosomes



Worms - Active hunters



Hopcroft/UAF/NOAA/CoML

polychaete



Hopcroft/UAF/NOAA/CoML

Chaetognath

Molluscs

- Pteropods - filter and mucus feeding
- Shelled and shell-



Hopcroft/UAF/NOAA/CoML

Cuvierina columnella



Hopcroft/UAF/NOAA/CoML

Cuvierina columnella



Hopcroft/UAF/NOAA/CoML

Euclio pyramidata



Hopcroft/UAF/NOAA/CoML

Diacria trispinosa

Planktonic larvae in the euphotic zone

- Many benthic and pelagic animals have epi-pelagic planktonic larvae
- Access to food
- Broad dispersal can be achieved

Diurnal vertical migration by zooplankton

- “Deep Scattering Layer” observed acoustically
- Up toward the surface during the night
- Down during the day
- Known since the Challenger, still enigmatic

Nekton

Organisms large enough and strong enough to travel where ever they want, influence, but not controlled by currents

Cephalopods, fish, reptiles, birds and mammals

Cephalopods

- Mollusca
- Generally fast-swimming predators
- Squids, octopuses, nautilus



Fish

- The most diverse and speciose vertebrates
- Will discuss more next class

Mammals

- Sea lions
 - Have external ears
 - Walk on their flippers



Mammals

- Seals
 - no external ears
 - Drag their rear flippers



Mesopelagic

- A huge habitat where light is dim enough for bioluminescence to function
- Bioluminescence is used for hunting and for hiding

Bioluminescence in the midwater

- [Widder images](http://www.pbs.org/wgbh/nova/sciencenow/0305/04-glow-flash.html)
 - <http://www.pbs.org/wgbh/nova/sciencenow/0305/04-glow-flash.html>
- [Scyphozoan burglar alarm](http://www.youtube.com/watch?v=xjaNzZt2olk)
 - <http://www.youtube.com/watch?v=xjaNzZt2olk>
- [Angler fish](http://www.youtube.com/watch?v=UXI8F-eloiM)
 - <http://www.youtube.com/watch?v=UXI8F-eloiM>

From: *Marine Biology: Function, Biodiversity, Ecology* (2nd Ed., 2001) by Jeffrey S. Levinton

Atlantic Ocean - thermohaline circulation

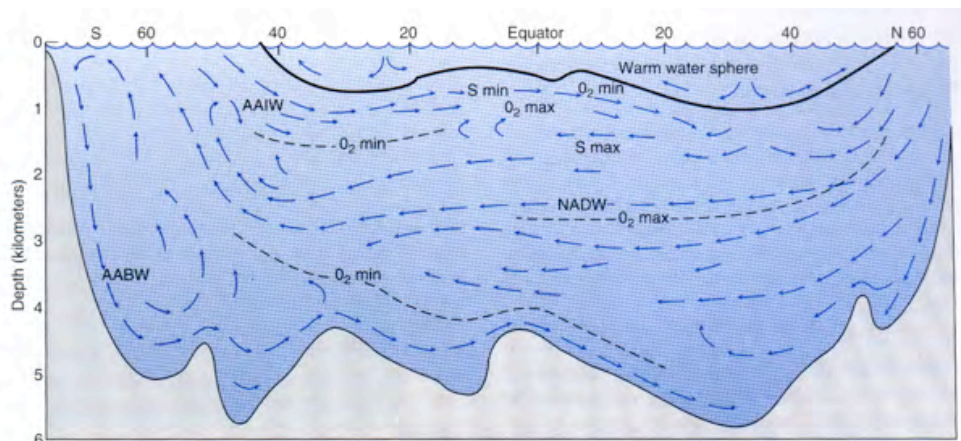


Fig. 2.16 Thermohaline deep circulation of the Atlantic Ocean. Water masses are as follows: AABW, Antarctic bottom water; AAIW, Antarctic intermediate water; NADW, North Atlantic deep water. (From Gerhard Neumann and Willard J. Pierson Jr., *Principles of Physical Oceanography*, copyright © 1966. Reprinted by permission of Prentice-Hall, Inc.)