Introduction to the

Biology of Marine Life

Ninth Edition

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Chapter 10

The Open Sea

The pelagic realm is a three-dimensional, nutritionally dilute habitat with low rates of primary production and few obvious niches.

Inhabitants of the Pelagic Division – Plankton

Fig. 10.2 Some large gelatinous zooplankton: (a) A pelagic mollusk, *Corolla*.

Inhabitants of the Pelagic Division

Fig. 10.2 Some large gelatinous zooplankton: (b) A ctenophore, Bolinopsis, swimming with eight rows of ciliated combs.

Courtesy of OAR/National Undersea Research Program/NOAA

Inhabitants of the Pelagic Division

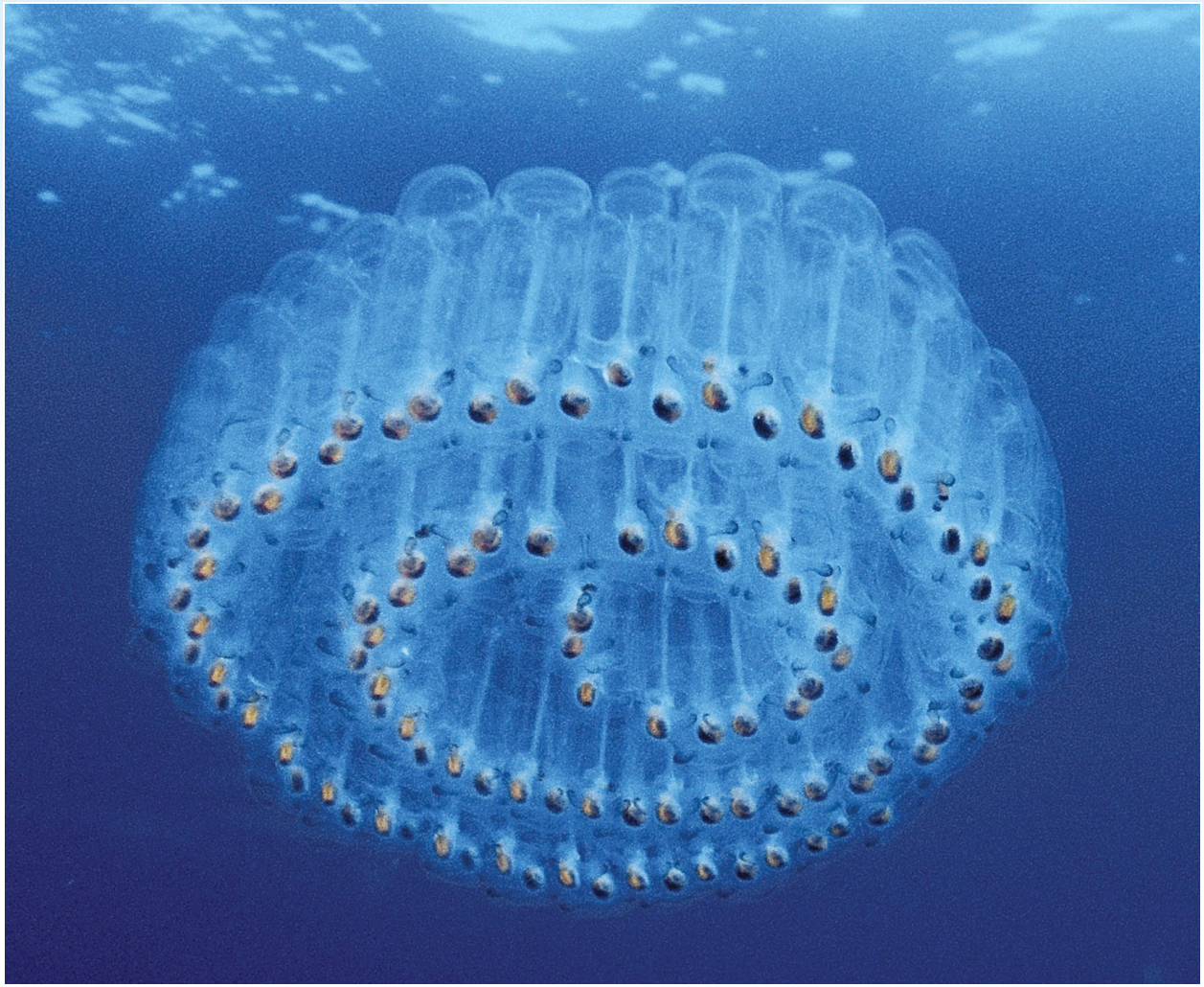


Fig. 10.2 Some large gelatinous zooplankton: (c) A colony of salps (*Pegea*) cloned from a single parent.

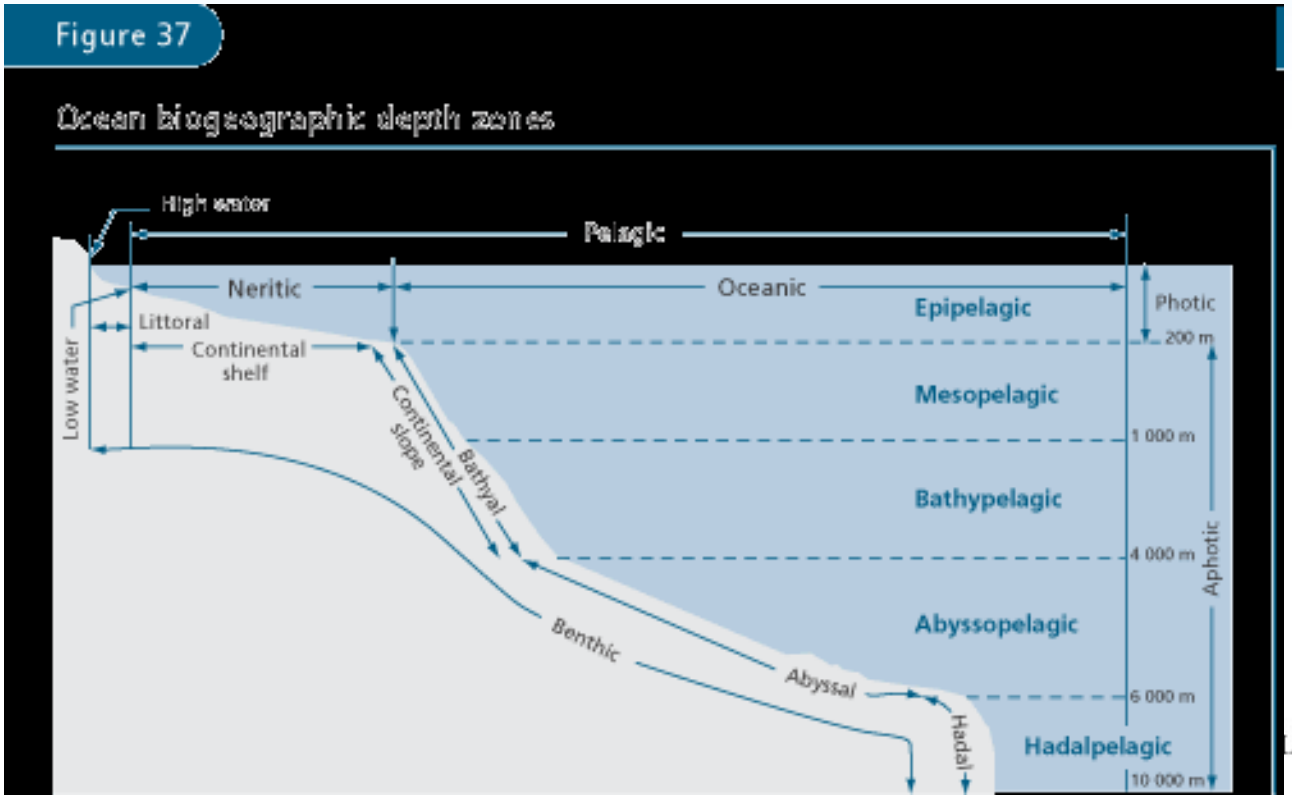
Inhabitants of the Pelagic Division - Nekton

- Large numbers of nektonic species also roam pelagic waters.

- Most nekton are vertebrates, and most marine vertebrates are fishes.

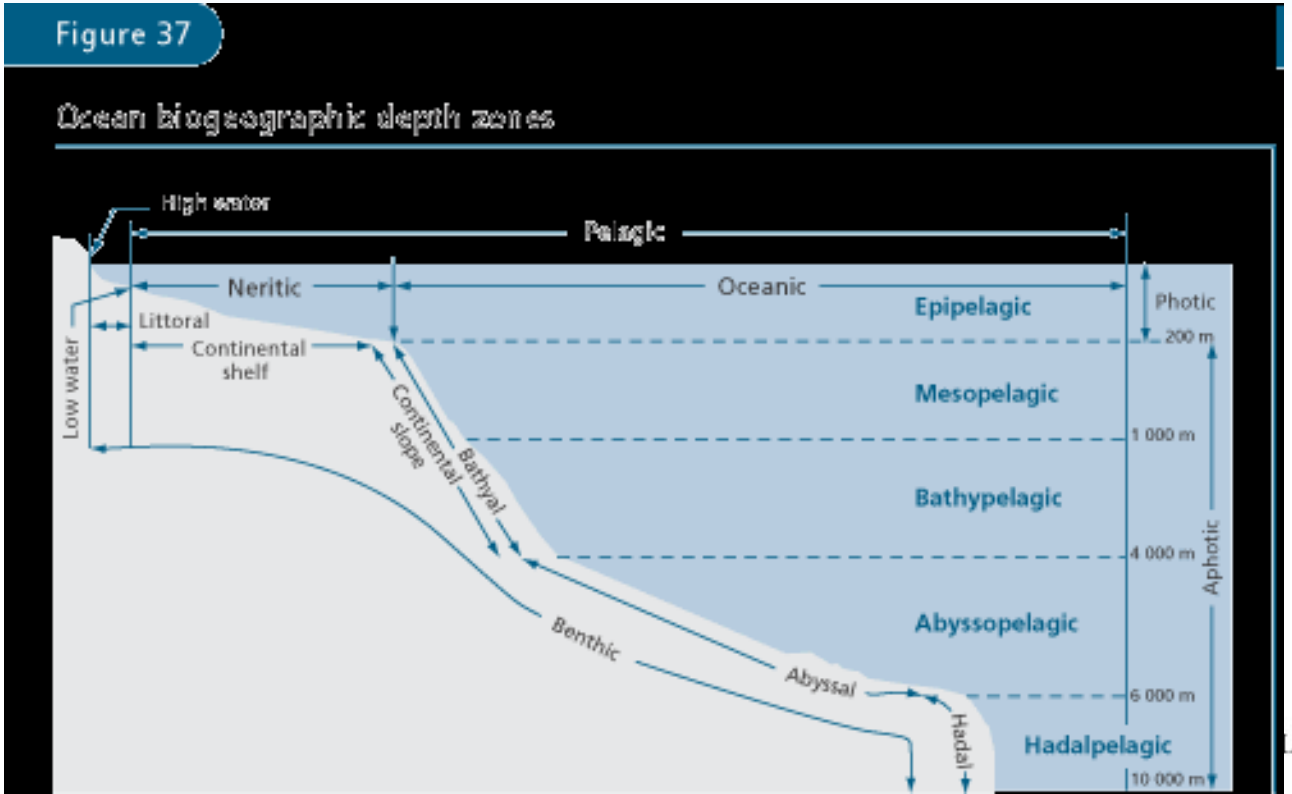
Geographic Patterns of Distribution

- Within the center of the large, semi-enclosed, oceanic current gyres is the epipelagic, or photic, zone.



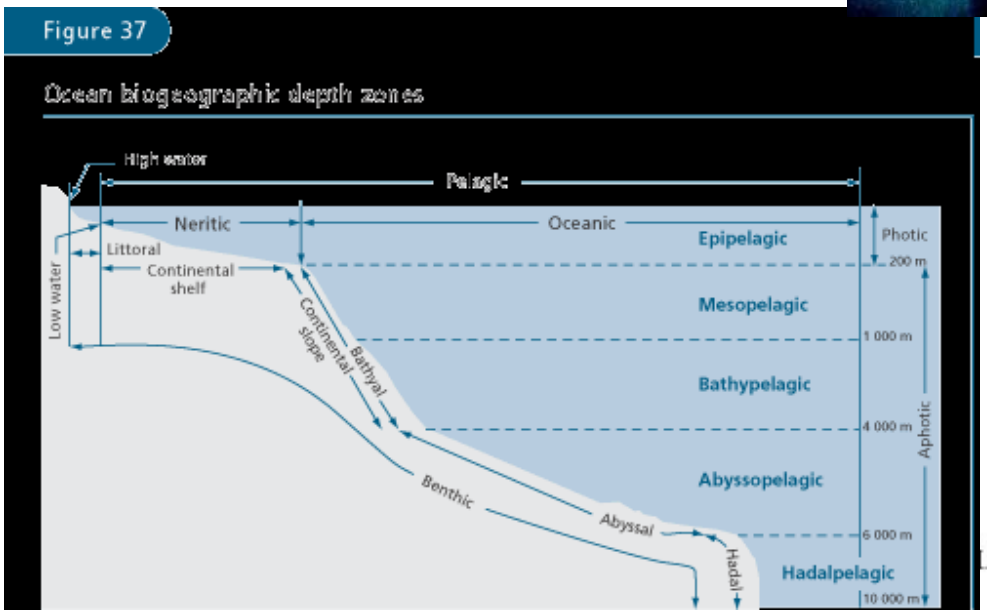
Vertical Distribution of Pelagic Animals

- Although the epipelagic zone accounts for less than 10% of the ocean's volume, most pelagic animals are found there. Why do you think so many organisms are here???



Vertical Distribution of Pelagic Animals

- From the bottom of the sunlit epipelagic zone to a depth of about 1,000 meters lies the mesopelagic zone.
- Dim light
- Depend on marine snow



Vertical Distribution of Pelagic Animals

- Mesopelagic fishes seldom exceed 10 cm in length, and many are equipped with:
  - well-developed teeth
  - large mouths
  - highly sensitive eyes
  - photophores

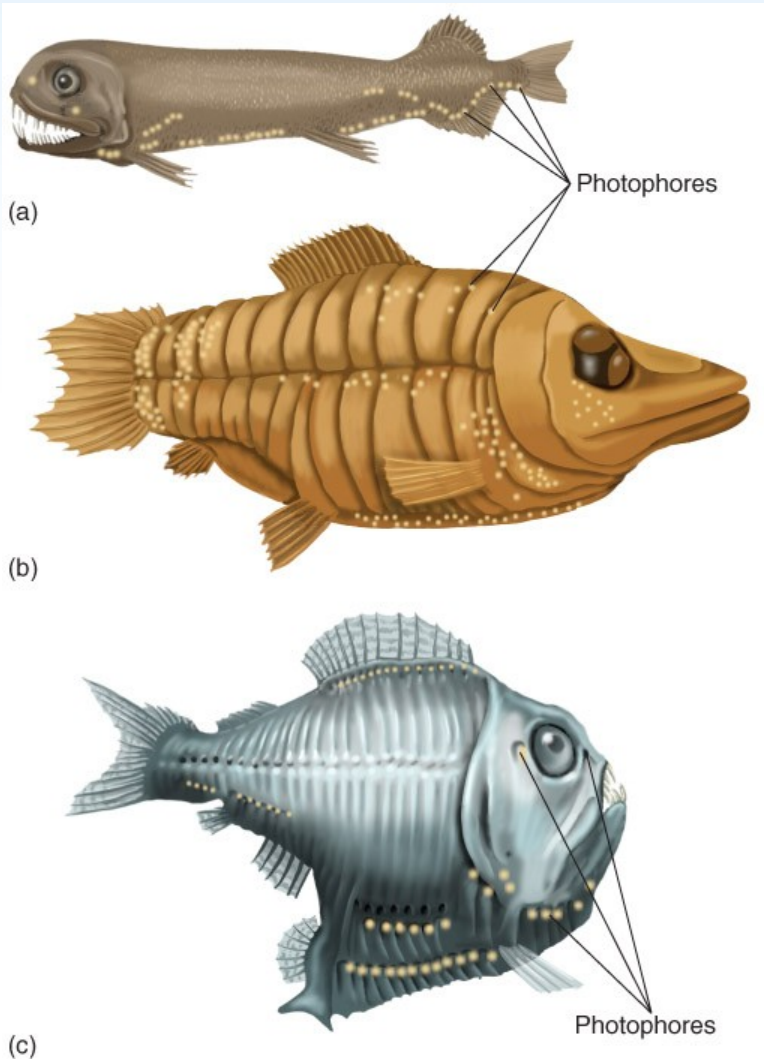


Fig. 10.6 Some mesopelagic fishes: (a) loosejaw, *Aristostomias*; (b) barreleye, *Opistoproctus*; and (c) hatchetfish, *Argyropelecus*. All are 5-20 cm in length.

Vertical Distribution of Pelagic Animals

- Below the mesopelagic zone, light comes largely from photophores, which are used:
  - as lures for prey
  - as species-recognition signals
  - possibly even as lanterns

Vertical Distribution of Pelagic Animals

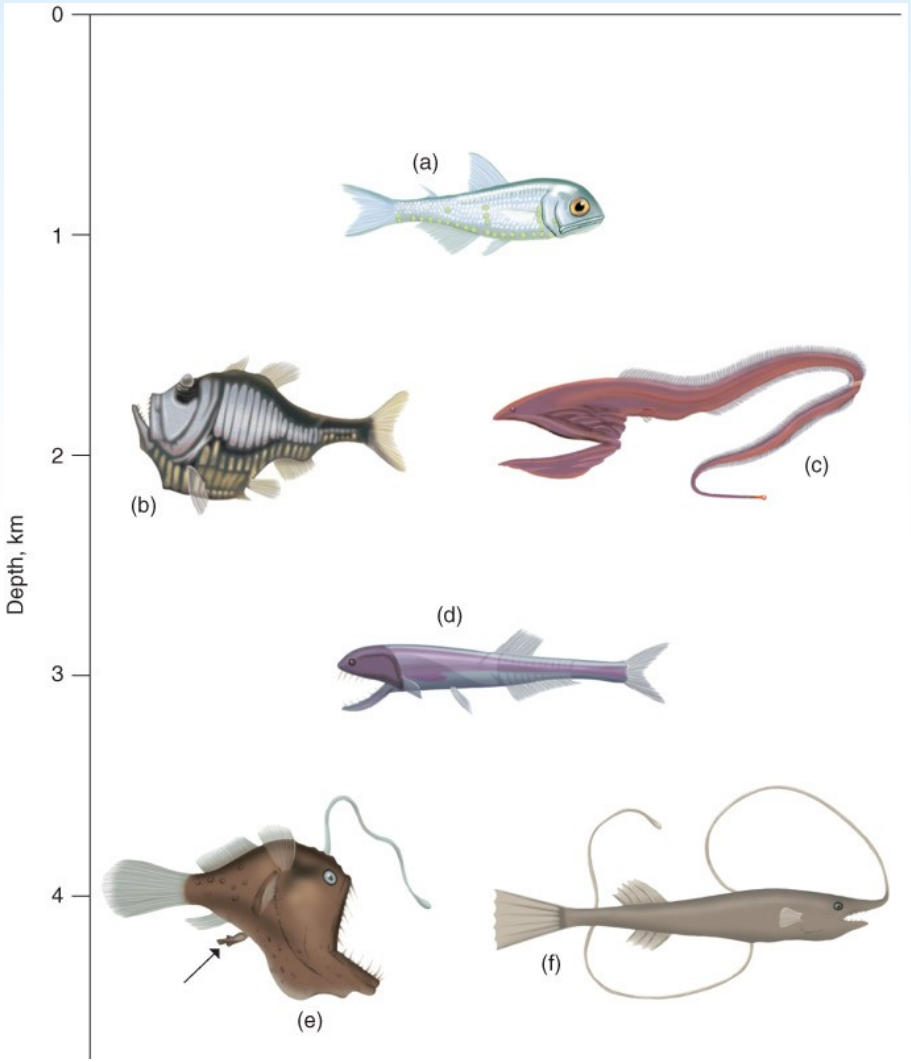


Fig. 10.8 A few fishes of the deep sea, shown at their typical depths. Most have reduced bodies, large mouths, and lures to attract prey. (a) A lanternfish, *Bolinichthys*; (b) a hatchetfish, *Argyropelecus*; (c) a gulper, *Eurypharynx*; (d) a bristlemouth, *Cyclothone*; (e) a female anglerfish, *Melanocetus*, with an attached male (arrow); and (f) another anglerfish, *Gigantactis*.

Vertical Migration: Tying the Upper Zones Together

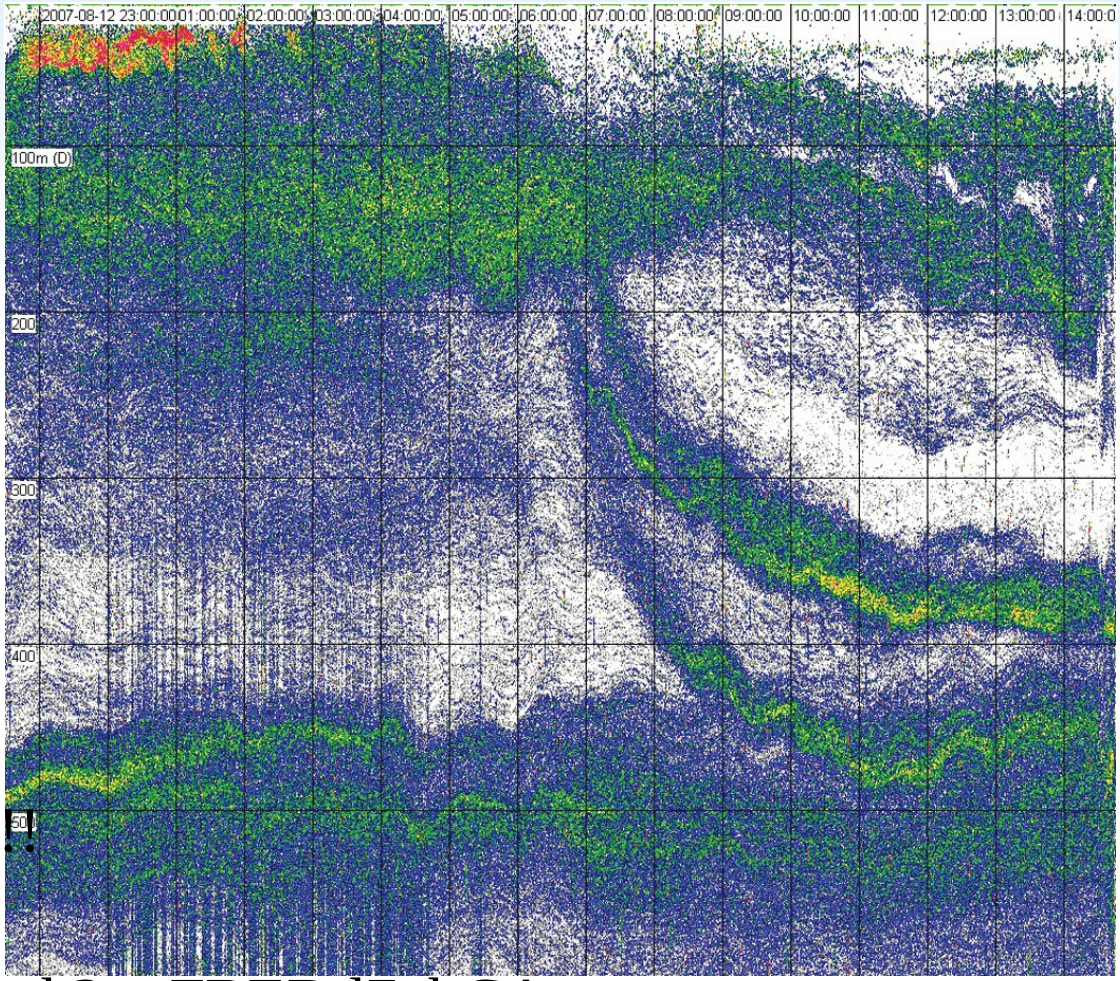


Fig. 10.10 A SONAR record of diurnal vertical migration of a mesopelagic community. At night (left), the community is seen at a depth of about 100 meters. At dawn (0700 hours in the center of the figure), the entire community descends to a depth of about 400 meters, where it will remain until ascending once again at dusk.

Vertical migration:
Not only found in copepods!!!

http://www.youtube.com/watch?v=FBEDd7obCAc

Courtesy of Andrew Brierley, Ph.D., and Martin Cox, Gatty Marine Laboratory, University of St. Andrews

Feeding on Dispersed Prey

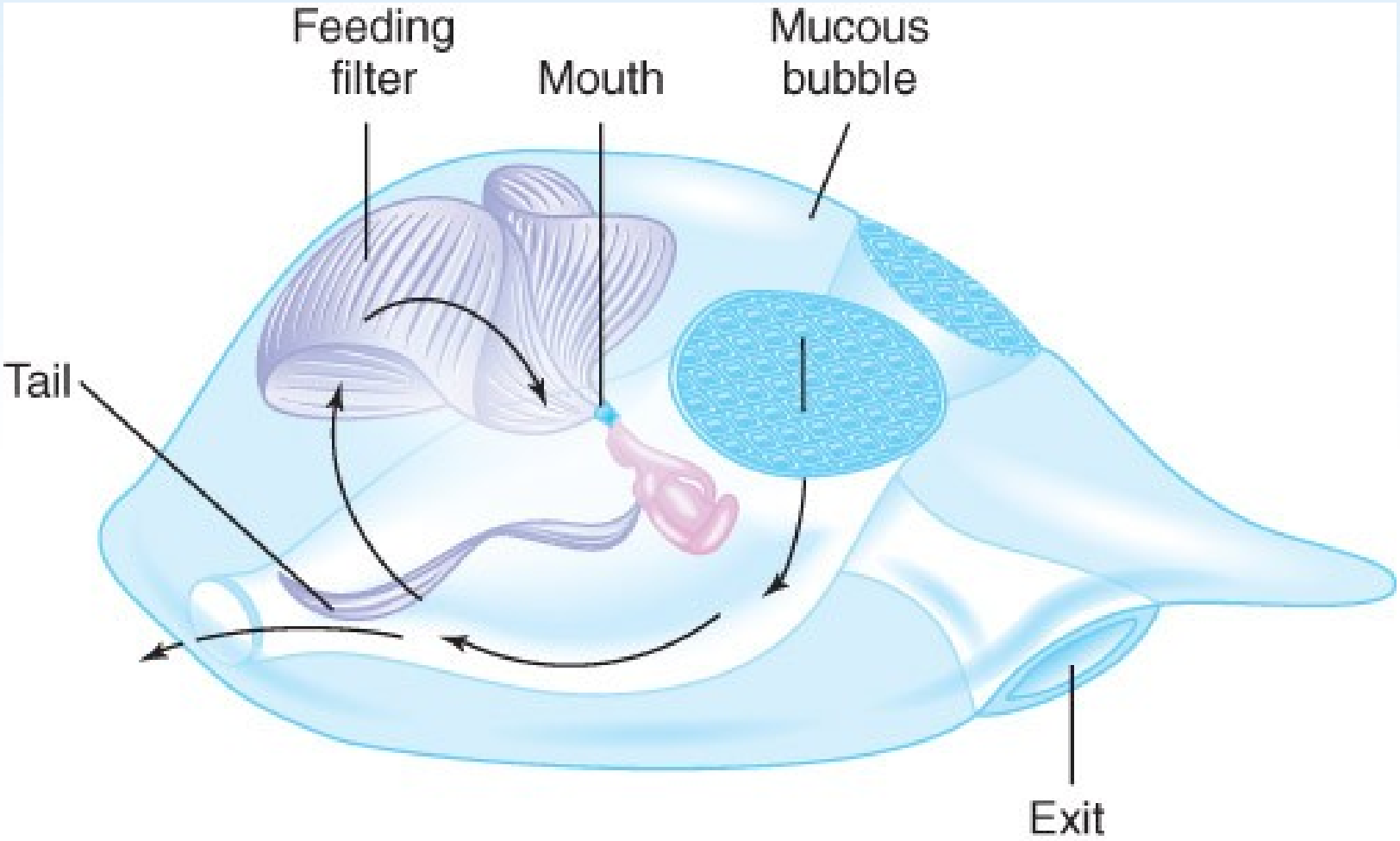


Fig. 10.18 The appendicularian *Oikopleura*, within its mucous bubble. Arrows indicate path of water flow.

http://video.google.com/videoplay?docid=9241370046415336 99#

Getting around in the open sea

Schooling

- Many pelagic species exist in well-defined social organizations called schools for:
  - protection
  - as a means of reducing drag while swimming
  - to keep reproductively active members of a population together

Getting around in the open sea

Schooling

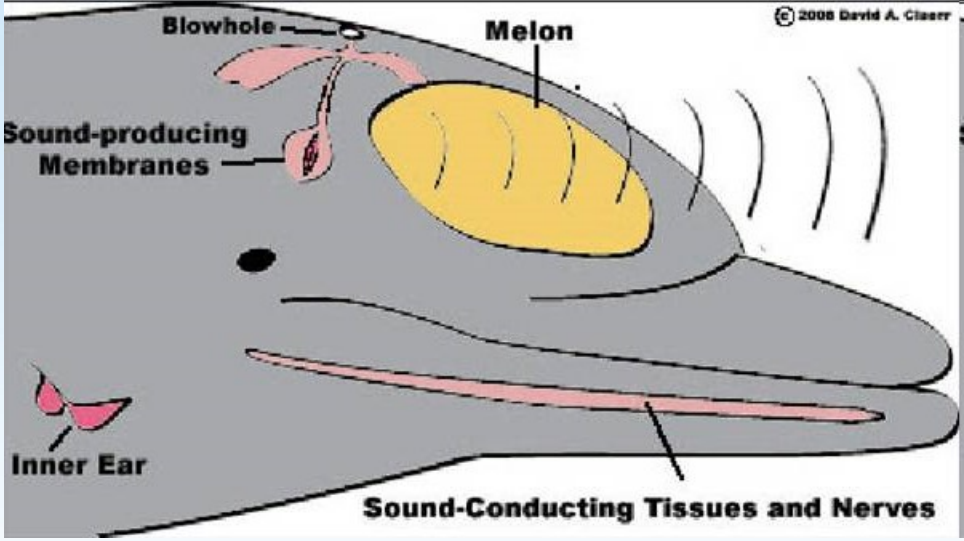
Fig. 10.29 A small portion of a large school of spotted dolphins (*Stenella*) sometimes found with schools of tuna.

Getting around in the open sea

Schooling

Fig. 10.30 Several requiem sharks exploiting a tightly packed school of baitfish.

Getting around in the open sea: Echolocation



- To compensate for reduced visibility and their inability to smell under water, odontocetes (toothed whales) and some other groups have evolved a system of echolocation

http://www.youtube.com/watch?v=BYiCzWZ8cBs&feature=related

Echolocation

Fig. 10.43 A bottlenose dolphin (*Tursiops*) with a prominent melon.