

# Marine Consumers

OCN 201 Biology Lecture 5



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## Consumer Types

- **Grazers**  
(Herbivore) Feeding on algae or phytoplankton, consuming the whole plant food or cropping the surface
- **Predators**  
(Herbivore, Carnivore, or Omnivore) Kill their prey
- **Parasites**  
Intimate, prolonged interaction between two organisms where one feeds on the other without killing it
- **Scavengers**  
Consume things already dead, carcasses
- **Detritivores**  
Consume things already dead, detritus
- **Decomposers**  
Final degraders of organic compounds

# Large Grazers

## Examples

manatee grazing on sea grass



urchin eating kelp



<http://www.ejfoundation.org/modules/PagEd/medipics/manatee-feeding-on-seagrass.jpg>

## Predators

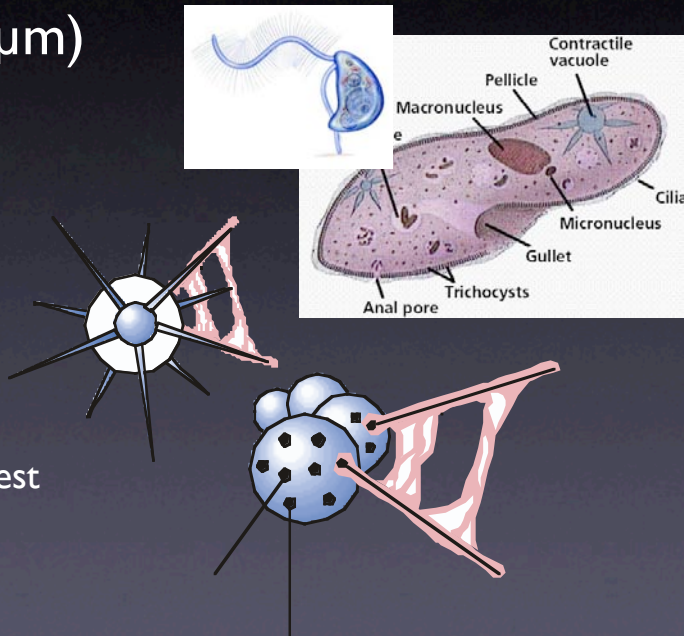
- Most primary production in the sea is by microscopic single-cell organisms
- Therefore, most primary consumers in the ocean are also microscopic!

# Predators

- Omnivory is common
- Prey size and capture efficiency controls diet for many organisms
- Most of the primary production is consumed by microzooplankton

## Protistan Predators (protozooplankton)

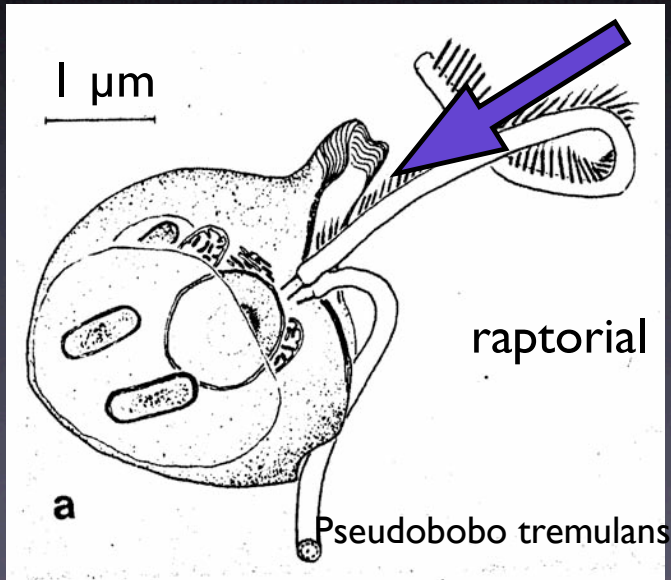
- Flagellates (1-10  $\mu\text{m}$ )
- Ciliates (100  $\mu\text{m}$ )
- Amoeboid
  - Radiolaria (0.5 mm)  
silica skeleton
  - Foraminifera (1 mm)  
calcium carbonate test



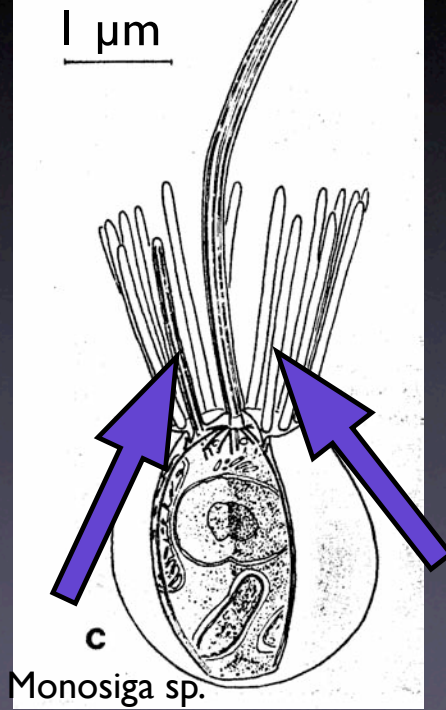


# Heterotrophic Flagellates

active interception



suspension feeding



# Heterotrophic Flagellates



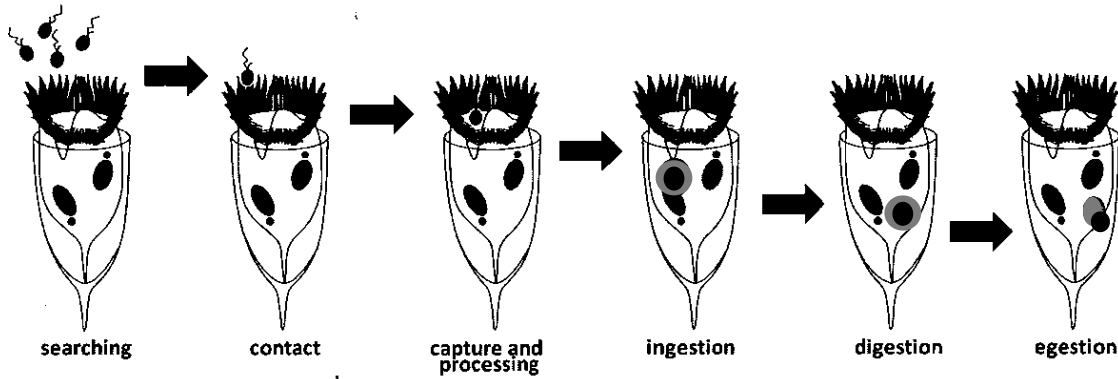
# Ciliates



# Ciliates



# Ciliates



(Montagnes 2013)

# Amoeboid Protists

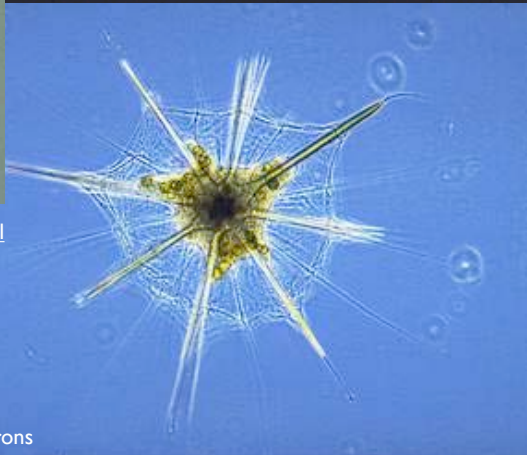
Radiolarians



Bernd Walz

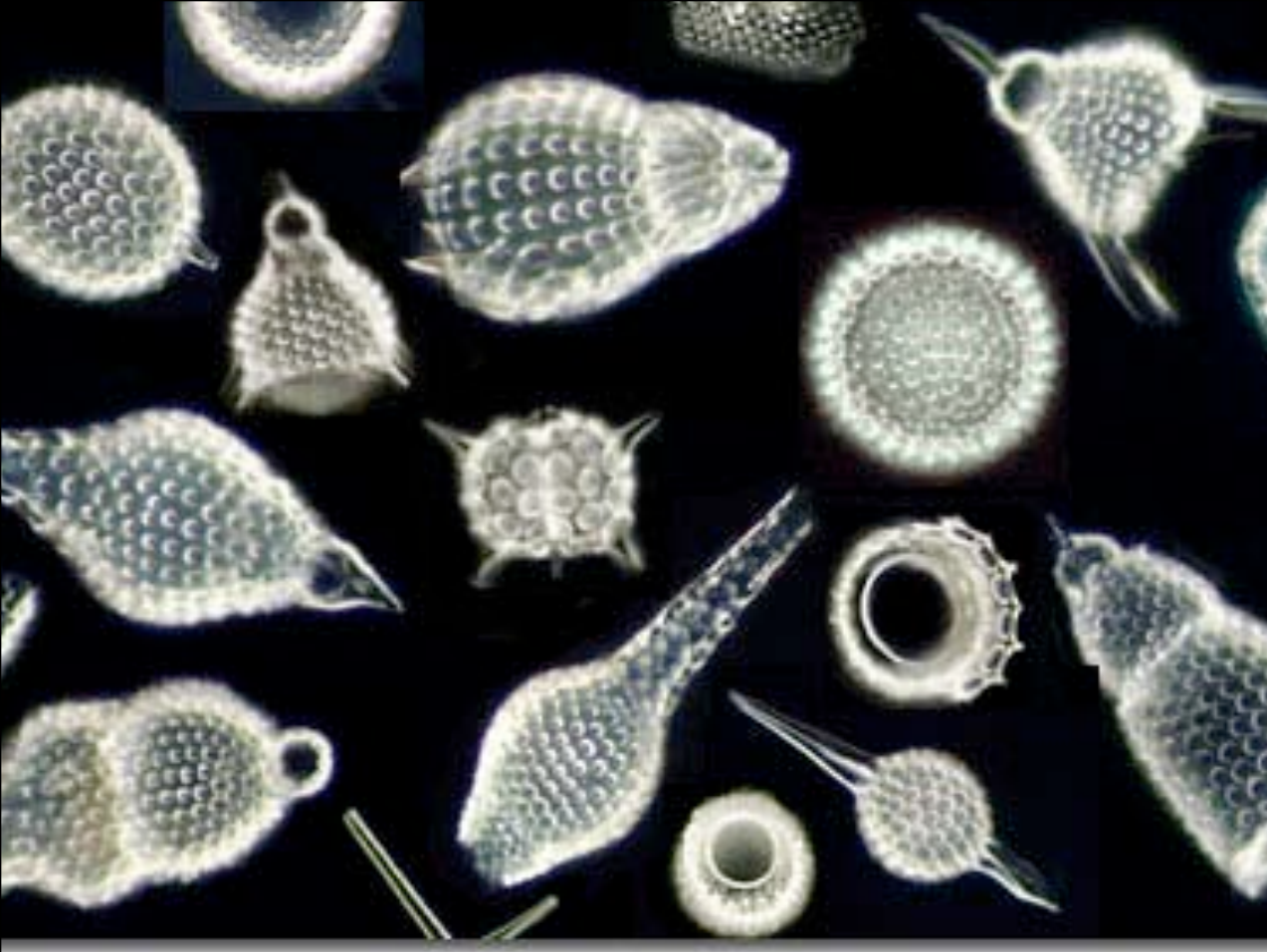
<http://www.microscopyu.com/staticgallery/smallworld/2008/id2008-walz.html>

Silica or  
Strontium Sulfate skeleton



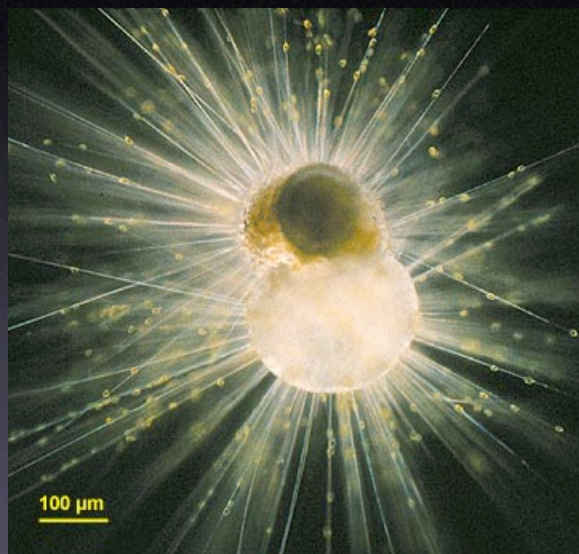
Robert Brons



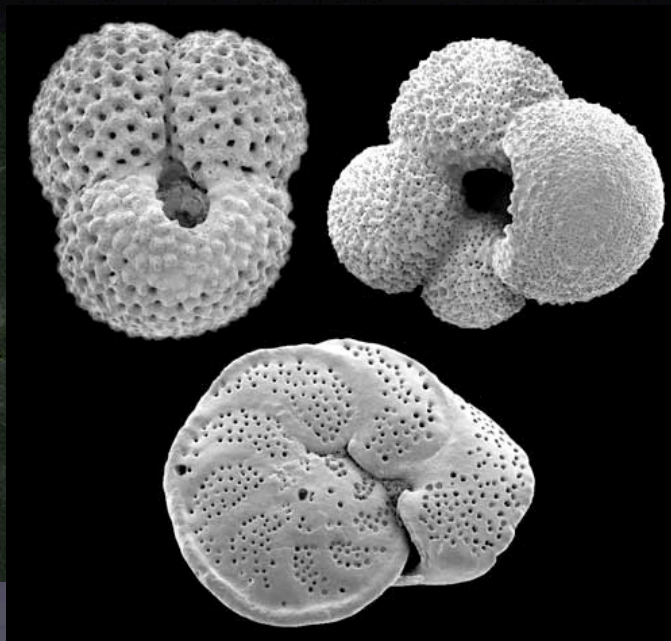


# Amoeboid Protists

Foraminifera



Globigerinella

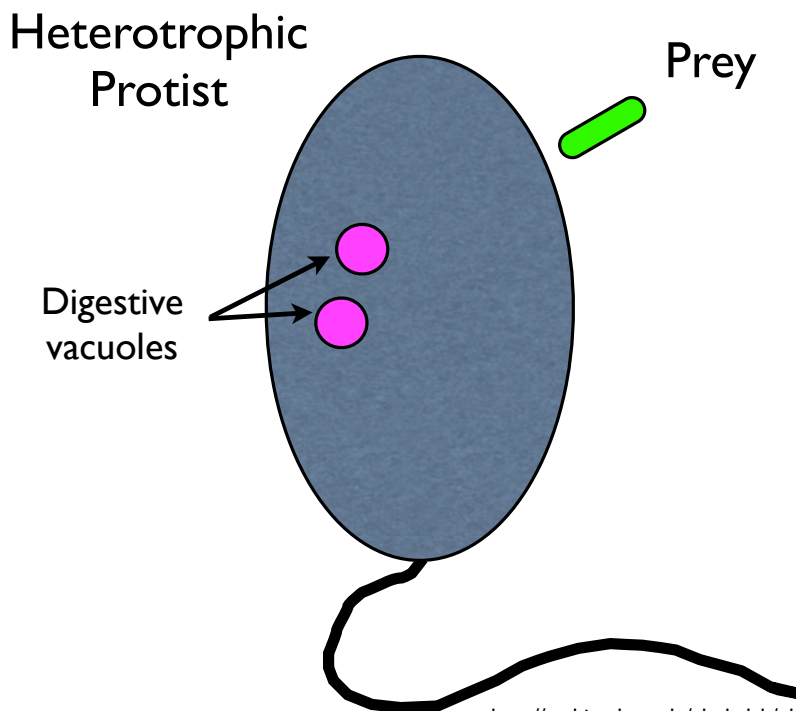


Calcium carbonate shell

# Protozoa

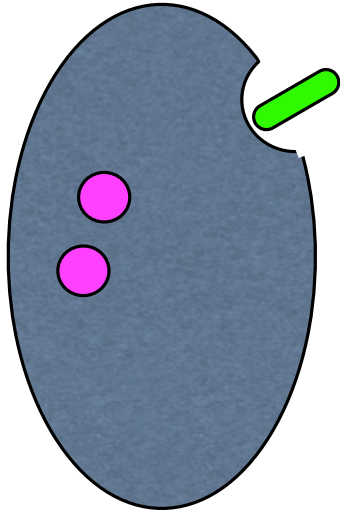
- No Mouth - Ingest particles mostly by phagocytosis.  
What do they eat?
  - bacteria
  - phytoplankton
- Digest particles in food vacuole inside the cell (in some cases, outside the cell)

## Phagocytosis

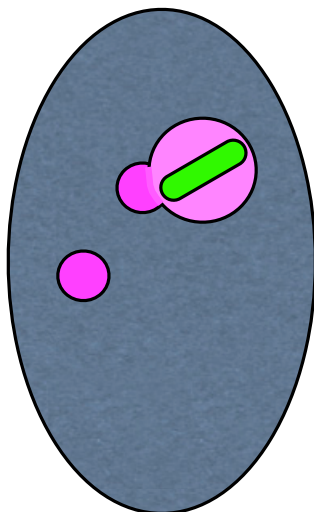




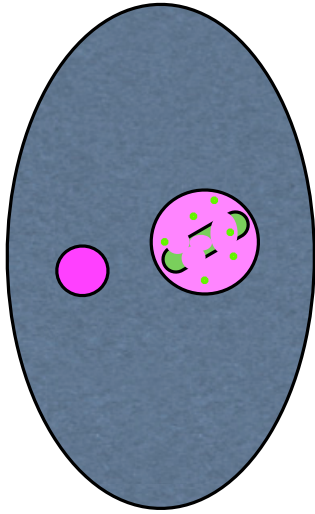
# Phagocytosis



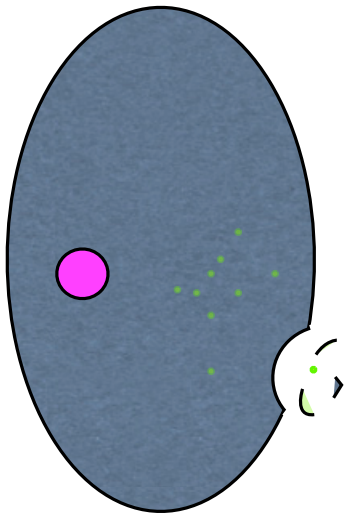
# Phagocytosis



# Phagocytosis

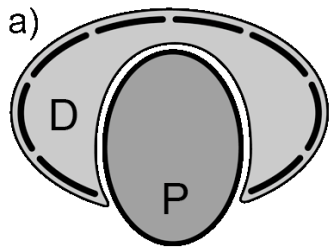


# Phagocytosis

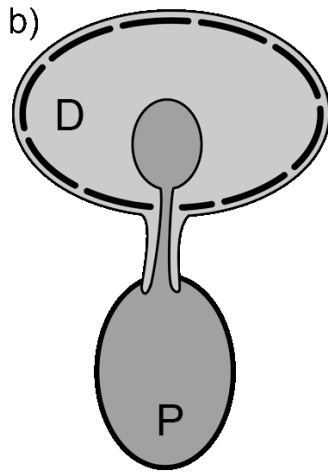




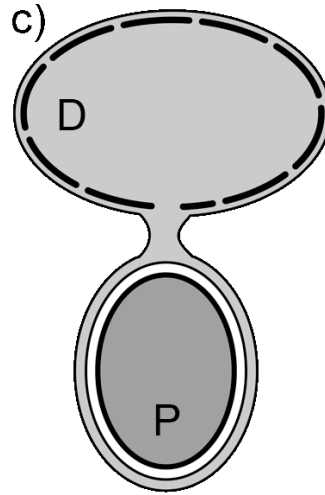
# Dinoflagellate Feeding Modes



Phagocytosis



Peduncle

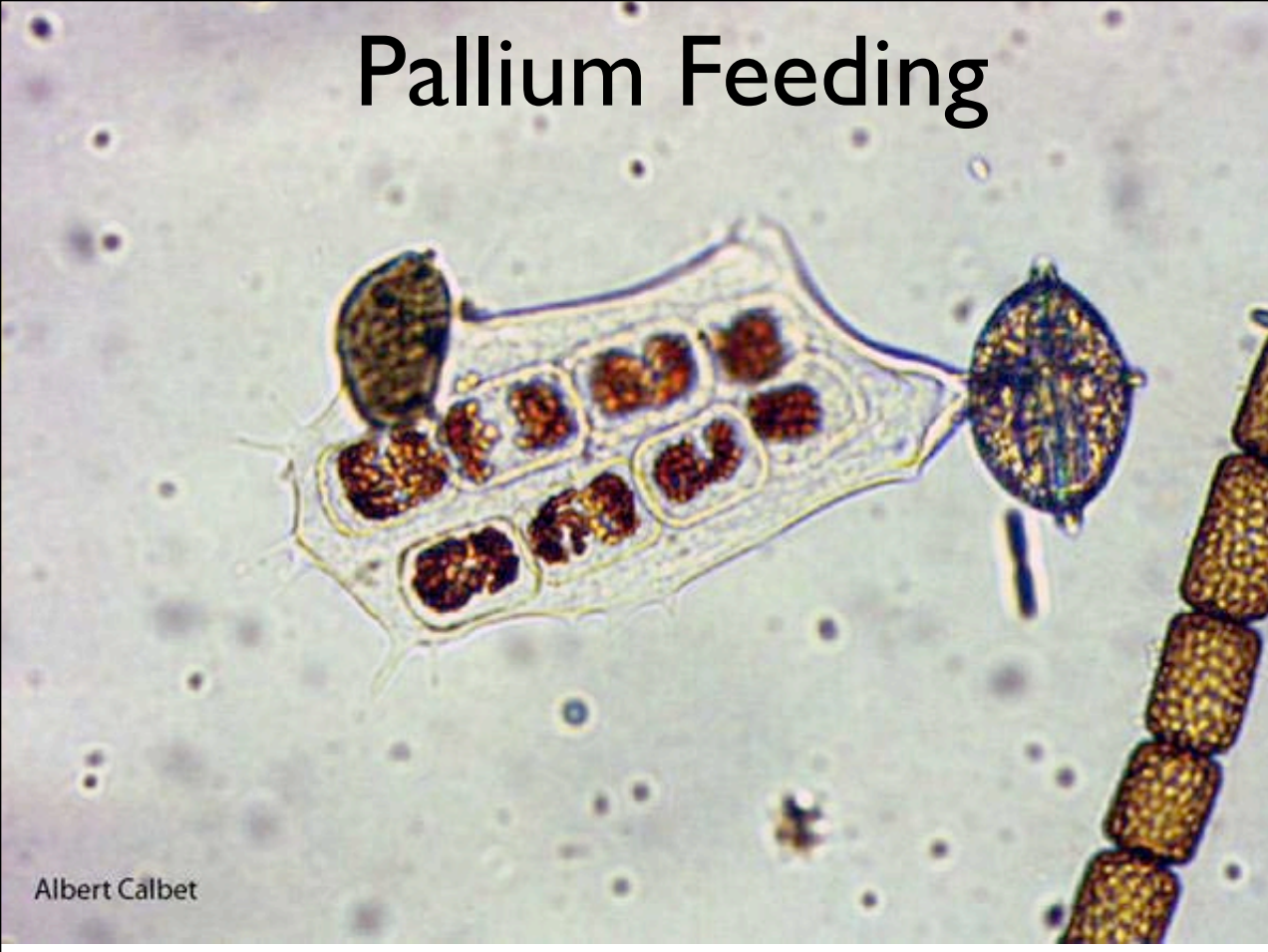


Pallium

## Peduncle Feeding



# Pallium Feeding



## Planktonic Animal Herbivores & Omnivores

- Crustaceans
  - ✦ Copepods
  - ✦ Euphausiids (Krill)

Complex feeding behavior: selective particle capture, some filter feeding, omnivorous



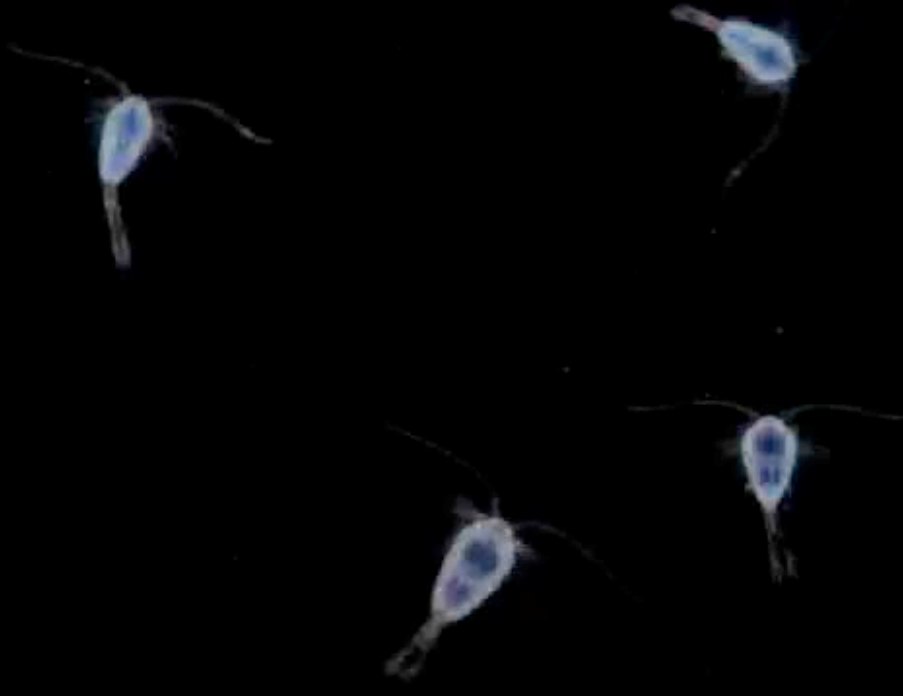
- Tunicates
  - ✦ salps
  - ✦ larvaceans
  - ✦ pyrosomes

True filter feeders





# Copepods



Blue Planet - BBC



Koehl & Strickler (1981) video  
*Subeucalanus pileatus*

*Selective particle feeders*



Rudi Strickler video  
*Subeucalanus pileatus*

Manipulating particles



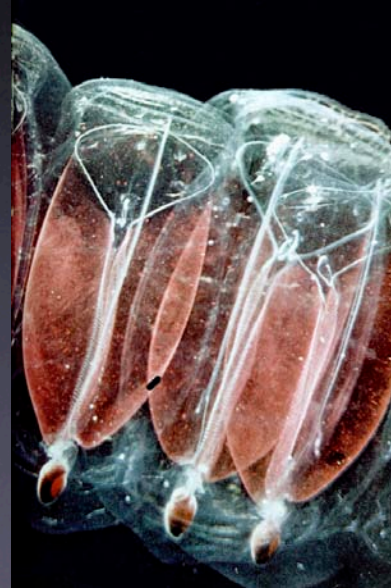
Rudi Strickler

**sticky water - the effect of low Reynold's #s**



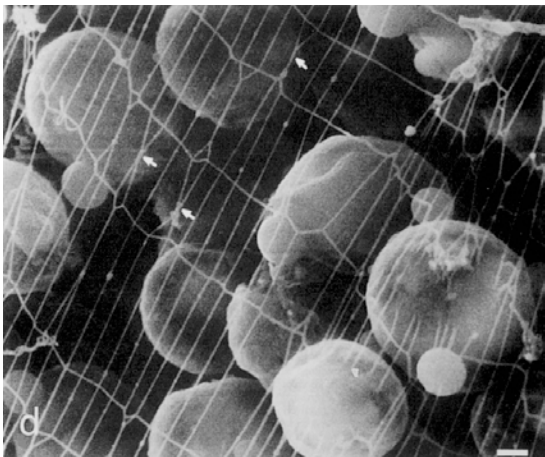
# Salps

- Gelatinous
- Pelagic
- Often colonial
- Major consumers of phytoplankton



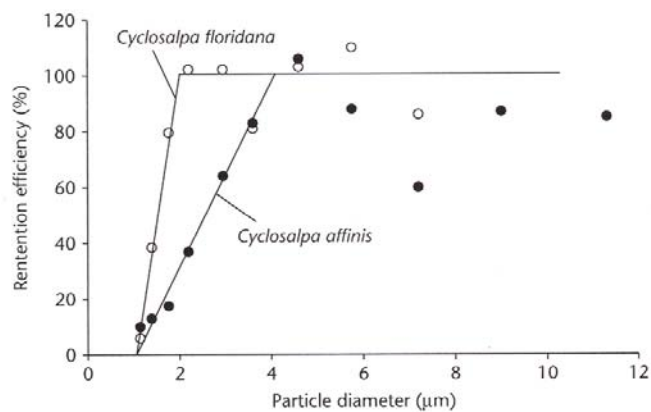
*Pegea confoederata* mucous nets.  
Zooids ~ 5 cm  
(Hamner 1974)

## Filter feeding in salps



1 μm

Mucous filter net of salp  
*Pegea confoederata*  
Bone et al 1991

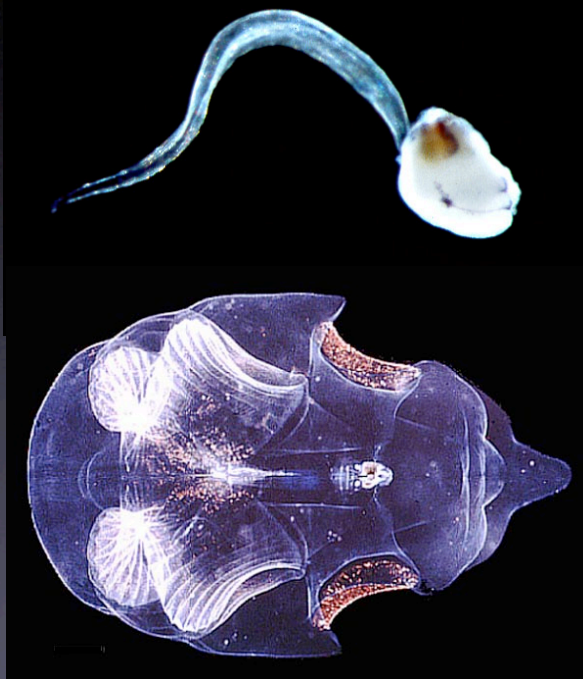


Retention efficiency of the mucous filtering screens of two salp species as a function of particle size – Harbison and McAlister 1979



# Larvaceans

- Small larva-like
- Secretes a mucus “house”
- Uses tail to create feeding current
- Catches food on filter

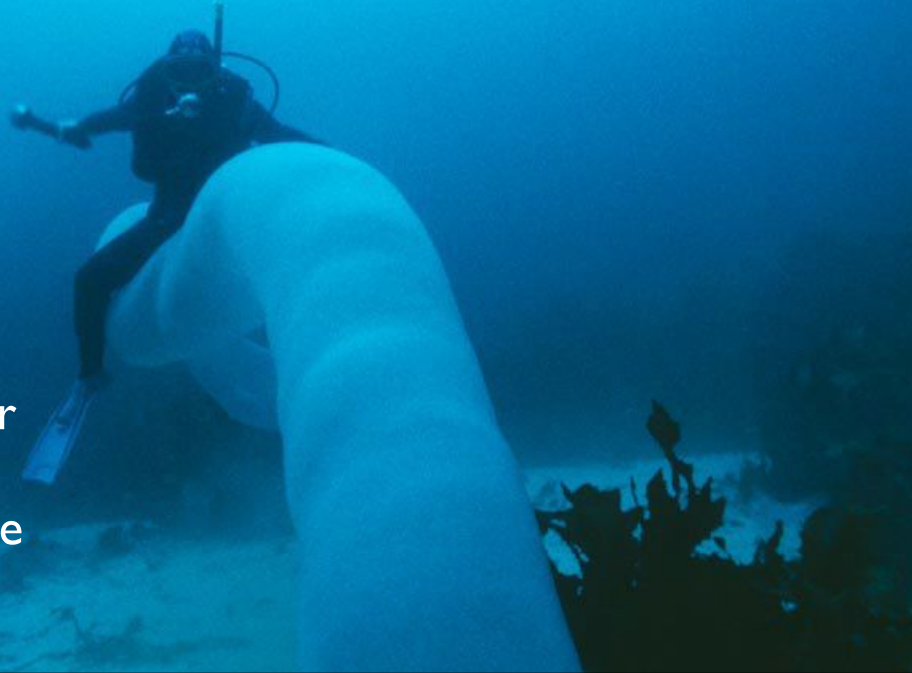




# Pyrosomes

Colonial  
pelagic  
tunicates

Filter feeders  
known for their  
brilliant  
bioluminescence

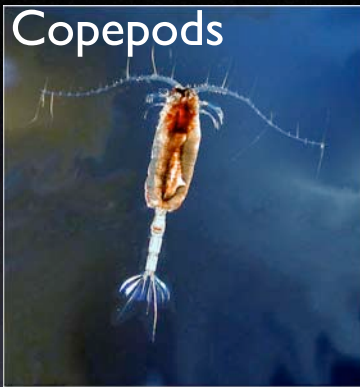


# Carnivorous Predators

Jellies



Copepods



Arrow worms  
(Chaetognaths)



Squid & Octopuses

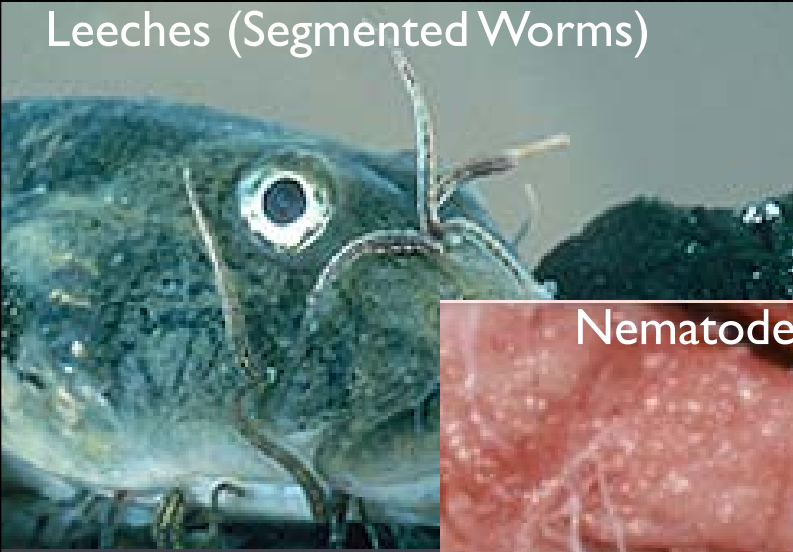
Fish and Sharks



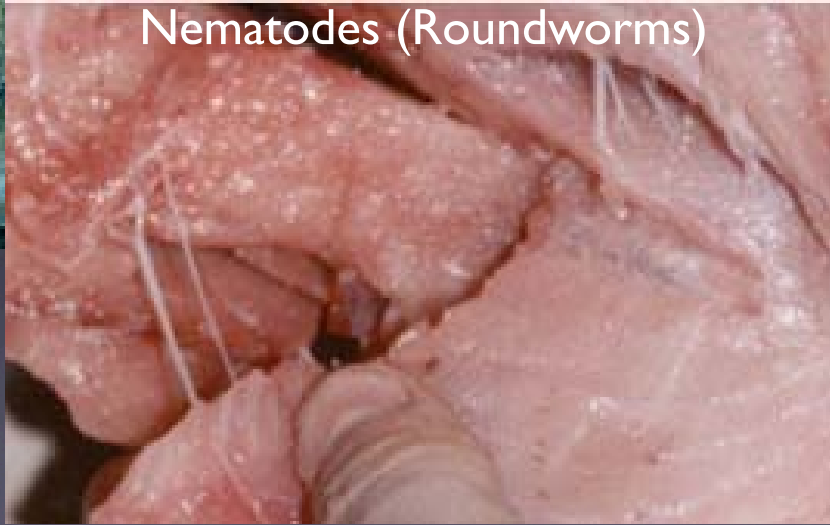
and MANY others in every group of animals

# Parasites

Leeches (Segmented Worms)



Nematodes (Roundworms)



# Parasites

sea lice = parasitic copepods, isopods





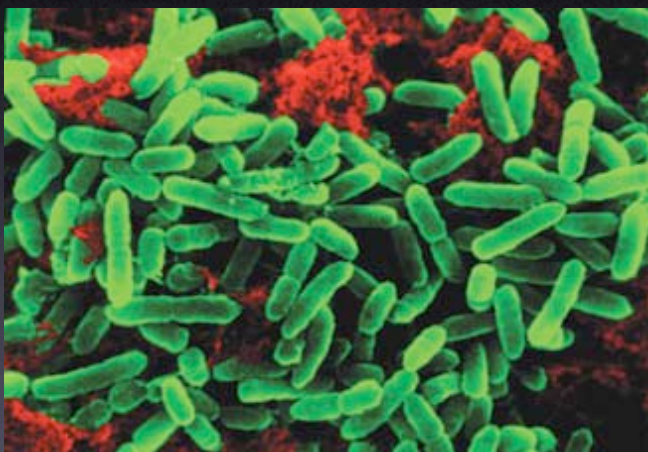
# Scavengers

Some fish, sharks, molluscs, crustaceans, etc.



# Decomposers

Bacteria

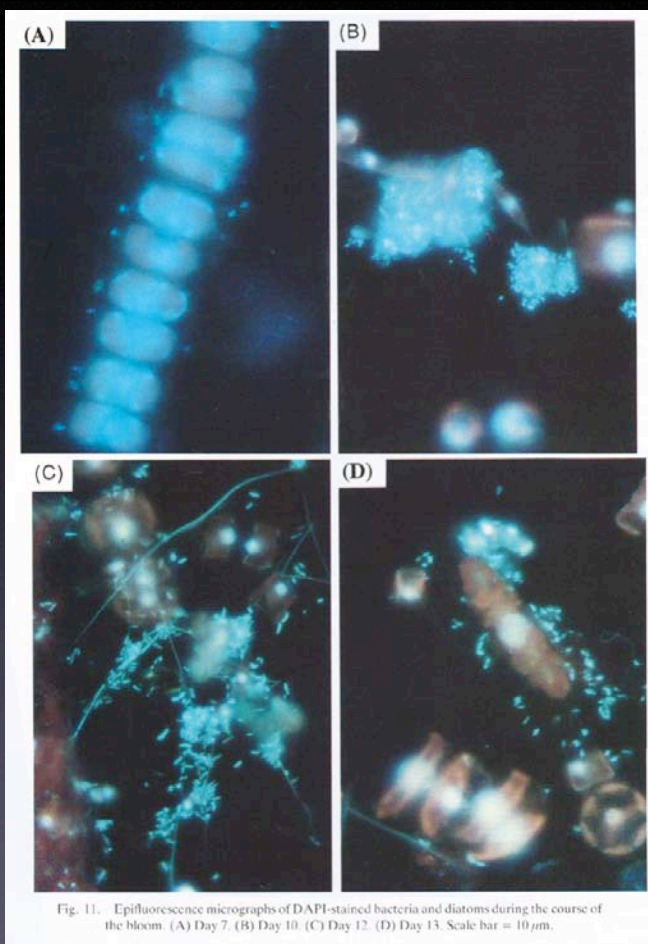


Fungi





# Bacterial colonization & degradation of blooms



## How do Bacteria Eat?

- **No Mouths** - digest food outside of the cell
- Digest larger molecules and particles with cell-surface enzymes
- Take up small molecules through special channels (porins, transporters)
- Many are motile (they move) - flagellum
- They decompose all the leftover organic matter from the messy feast of the food web

Questions?