Invertebrates

Vertebrates
Phylum Mollusca

Class Polyplacophora
- chitons

Class Gastropoda
- Snails
- Sea slugs
- Nudibranchs

Class Bivalvia
- Clams

Class Cephalopoda
- Squid
- Octopus
- Cuttlefish
- Nautilus

More than 500,000 known species
Phylum Mollusca
“Soft-Bodies”
A bag, A foot, and A Scraper
Over 100,000 species strong
Phylum Molluska

- Most successful phylum in the ocean
- Well developed organ systems
  - Nutrition
  - Reproduction
  - Excretion
  - Etc.
Mollusca Characteristics:

1) Bilateral symmetry.
2) Absorb oxygen from water using gills.
3) Hydrostatic skeletons (some may also make a shell for protection).
4) Complete digestive tract.
All Mollusks share “3” features:

1) Mantle – covering of the soft body that encloses internal organs and produces a shell (if there is one).

2) Foot – muscular organ used for locomotion.

3) Modified feeding structures.
Class Polyplacophore

1) “Many plates” – Each contains a row of interlocking plates on dorsal side of body.

2) Benthic organism.

3) Oldest and least commonly known class.

4) Ex. Chitons
Class Pelecypoda / Bivalvia

1) “hatchet foot”/ “two folding door”

2) Two shells connected at one point called the umbo. Shells are held tightly together by adductor muscles.

3) Move water through siphons that pull water in one opening and expel the water out through a second.

4) Secrete substance called nacre. Produces the inside of the shell (mother of pearl) and when surrounding an irritant can become a pearl.

5) All are filter feeders.
Class Pelecypoda / Bivalvia Examples

1) Clams – dig into soil using powerful foot.
2) Oysters – attach to each other and hard structures.
3) Mussels – attach using Byssus threads (“beards”).
4) Scallops – can swim short distances by closing shell with powerful mussels.
Clam - Internal Features

- umbo
- gonad
- digestive gland ('liver')
- cardinal teeth
- anterior adductor
- posterior adductor
- exhalant siphon
- inhalant siphon
- gill (cut)
- foot
Scallops
Nicknamed: gooey duck
Oysters
Yummy
But watch out – filter feeders, so if toxins in water, they pick it up, we eat, could be bad news
Class Gastropoda

1) “stomach foot”

2) Most crawl but some can swim using modified mantle flaps.

3) Radula – feeding structure
   1) Some use as rasping device for scraping algae drilling holes into the shells of animals.
   2) Others have modified harpoon with venom.

4) Proboscis – long extension for sensing chemicals in water and ingesting food.
Class Gastropoda Examples

1) Snails have single calcareous shell that can used for protection from predators.

2) Nudibranchs (sea slugs) have the ability to eat cnidarians without firing the nematocysts. They then use the nematocyst for their own protection.
Triton’s trumpet
Spanish Dancer (nudibranch) & egg mass
nudibranchs
Class Cephalopoda

1) “head foot”
2) Foot specialized into arms and/or tentacles that is attached to the head
3) Large eyes (most have vision better than that of our own)
4) Most intelligent of all invertebrates.
5) Many have chromatophores (colored cells) that change in size and shape.
6) Use ink to confuse predators and escape.
7) Feed with sharp beak.
Class Cephalopoda Examples

1) Squid – 8 arms and 2 tentacles. Move by jet propulsion by expelling water through siphon and fins on mantle. Have internal remnant of a shell called a pen.

2) Octopus – Slowly move along bottom with 8 arms.

3) Cuttlefish – has brittle, calcium based shell remnant called a cuttlebone. Moving air in and out of cuttlebone provides buoyancy.

4) Nautilus – only cephalopod with external shell.

Mimic Octopus
Octopus Intelligence

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

Start at 2 minutes
http://www.youtube.com/watch?v=PmDTtkZIMwM
Mimic octopus from Indonesia

flounder

http://www.youtube.com/watch?v=os6HD-sCRn8

lionfish

Sea snake
Blue-ringed octopus

Highly venomous
Squid (Giant)
Architeuthis dux

- mantle
- fin
- reproductive organs
- systemic heart
- stomach
- brachial heart
- gill
- ink gland
- funnel
- liver
- eye
- radula
- 8 arms covered in suckers on one side
- two long feeding tentacles
- sucker-covered ends called clubs

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Squid
Fastest swimmers among invertebrates
Foot divided into 2 tentacles and 8 arms (tentacles are...
Larval Squid
Cuttlefish
Nautilus
The only cephalopod with an external shell
Chambers walled off as it grows;
Nautilus lives in last chamber
all others filled with gas
Class Scaphopoda

- Also known as “tusk shells”
- Visceral mass is enclosed in a long, tubular, tooth-like shell.
- Foot is cone-shaped
  - Used for burrowing in sand
Class Pteropoda

- Sea butterfly
- Small marine mollusk
- Foot modified to wing-like lobes
- Makes a mucous web (up to 5 cm) to capture food
Phylum Mollusca Song

- Giant Octopus
- Color Changing Octopus