Gastropoda

- 3 subclasses
  - Prosobranchia – shelled
    - Marine, freshwater, and terrestrial
  - Opisthobranchia – “shell-less”
    - Marine – sea hares and nudibranchs
  - Pulmonata – shelled and shell-less
    - Freshwater and terrestrial
• Subclass Opisthobranchia (“behind gills”) – sea hares and nudibranchs
  • Over 8,000 species worldwide – mostly marine but some freshwater
  • Shell reduced and internal or absent
  • Ctenidia and mantle cavity reduced or absent
  • Detorsion

• 1 or 2 pairs of rhinophores (tentacles)
• Hermaphroditic
• Aposematic coloration
• Radula present - may be greatly modified
• Fossil record?
• 9 orders
Gastropoda

- Shell loss
  - Shell production energetically expensive
  - Must have a source of calcium
  - Opisthobranchs secrete shell, cover it with mantle then reabsorb during development

Gastropoda

- Ctenida loss
  - Cerata formed on dorsal side

Gastropoda

- Detorsion
  - Torsion occurs first then detorsion during development
  - Usually 90° but may detort 180°
Gastropoda

- Rhinophores
  - Chemical sensory structures—may be associated with cephalic tentacles

Gastropoda

- Hermaphroditic
  - Usually deposit egg mass
  - Egg mass may be “protected”

Gastropoda

- Aposematic coloration
  - Brightly colored meaning “stay away” or “don’t eat”
  - Typically eat sponges, corals, hydrozoa, bryozoans, plankton
  - Incorporate cnidae into cerata (kleptocnidiae) as well as egg mass
  - Also secrete chemical irritant
Gastropoda

- Order Anaspidea – Sea hares
  - *Aplysia californica*
  - Commonly used in neurological studies

Gastropoda

- Order Cephalaspidea
  - *Bulla* – Bubble shell
  - Shell posterior
  - Soft radula with 3 or 4 gizzard plates

Gastropoda

- Order Notaspidea
  - *Berthellina* – Apricot slug
  - May be found in Gulf
  - Very thin shell
Gastropoda

- Nudibranchia – “naked gills”
  - Chromodoris
    - Salt and Pepper slug
  - Branchial plume

Gastropoda

- Subclass Pulmonata
  - ~30,000 species
  - Ctenidia lost – replaced with a pneumostome
  - Air drawn into a vascularized chamber or direct gas exchange in water
  - Freshwater and terrestrial
  - Shelled and shell-less
  - Operculum usually absent

Gastropoda

- Cephalic tentacles with basal eyes
- Widespread - arid to 11,000 ft
- Environmental indicators
- Well represented in fossil record
- Regionally not well studied
- Radula present – scrappers and shredders
- 2 orders
Gastropoda

- Order Basommatophora
  - *Physa* – Common pond snail
  - Shell sinistral
  - Feed on algae and diatoms
  - Tolerant to brackish and polluted water
  - Hermaphroditic
  - Buoyancy control

Gastropoda

- Order Stylommatophora
  - Eyes on tip of stalks
  - May use stimulatory dart
  - *Achatina* – Giant African land snail
  - Eats everything
  - Disease and parasite vector
  - Up to 20cm

Gastropoda

- *Helix* – Common land snail
  - Exotic food source
  - Escargot
  - Widespread
Gastropoda

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- Ariolimax – Banana slug
- No shell
- Mantle saddle
- Pneumostome present
- Detritivores
- Important in N recycling
- Up to 20 cm

Gastropoda

- Radula – complex structure
- Chitonous
- Rhipidoglossate
  - archaeogastropoda lateral and marginal teeth
- Taenioglossate
  - mesogastropoda reduced marginal teeth

Gastropoda

- Rachiglossate – neogastropoda
  - lack of marginal teeth
  - Mainly boring
- Toxoglossate
  - Cone shells
  - Highly modified for stabbing
Gastropoda

- Ptenoglossate – grasping
- Raptorial or bloodsucking
- Extend buccal cavity around prey, grasp with radula and draw entire prey into body

Janthina janthina

Gastropoda

- Other radula modifications
- Algae-eating gastropods have lance-like teeth on radula that pierce the cellulose wall and suck out contents (sacoglossate)

Gastropoda

- Compare mollusk populations – modern vs. Irvingtonian (300,000 to 700,000 years old) in South Park, Colorado
- Mollusks from Porcupine Cave
Gastropoda

- What is the modern assemblage?
- Are modern and ancient assemblages comparable?
- Does modern environment compare to ancient?

Gastropoda

- Identification

Gastropoda

- Questions?