SUPERCLASS: Agnatha
CLASS: Myxini = hagfish
CLASS: Cephalaspidomorphi = lamprey
SPECIAL INTEREST
ORDER = Petromyzontiformes
PETROMYZON MARINUS

- The sea lamprey. Originally described by Linnaeus back in 1758. This species is native to much of the coastal areas in the Northern Atlantic.
- Petromyzon = stone sucking !!!
- This is the creature that got into the Great Lakes and has caused havoc. ?
HAGFISH = CLASS MYXINID

- Entirely Marine
- Scavengers or predators feeding off dead or dying fish and sea life.
- Senses: very poor sight, but good senses of touch and smell.
NOTABLE FACTS ABOUT HAGFISH

- Excellent Adaptation: Its body fluid are in osmotic equilibrium with sea water. *This makes it easier to maintain water balance and deal with some waste.*
- Can tie itself in a knot to more securely attach itself to its prey.
- Can generate enormous amounts of slime.
LAMPREYS =

- Marine and freshwater.
- Marine species are anadromus.
  - Which means they live in the sea/ocean and migrate up freshwater streams to spawn. Like salmon.
- Around ½ of lamprey species are parasitic and the others as adults do not feed and their digestive systems reduces in size and becomes non-functional.
CHARACTERISTICS: ANATOMY AND STRUCTURE

- Only medial fins. No paired appendages.
- Long eel like shape.
Most notable external characteristic.
A jawless mouth, that is used for sucking and rasping.
Mouth contains 11 to 12 rows of circular horny teeth enclosed by an oral hood. This teeth hood arrangement is called a **buccal funnel**.
The **buccal** gland in the mouth releases an **anticoagulant**, that helps the flow of blood when it attaches to a fish.
The superior design of the buccal funnel allows it to attach to fish and get a good seal, which helps maintain correct pressure for blood flow.

Prefers, blood and body fluids, but some flesh etc. also is consumed.

Under lab conditions feeding lasts 76 hours. With young adults up to 200!!

No stomach only an intestinal tract.
INTERNAL SECTION DIGESTION
SKELETON SYSTEM

- Has **notochord** present as an adult.
- It is slightly modified in that it has vertebral arches, and thus are put with the subphylum vertebrata.
- **Cartilaginous** skeleton with a **cranium**, a brain case.
CIRCULATORY AND EXCRETORY

- **Two** chambered heart. Of interest with hagfish they have 3 additional aortic arches, but with a low pressure circulatory system.

- **Mesonephric** Kidney: “middle” kidney (out of 3) filters waste materials

- Excretion of waste through **anus/cloaca** and possibly gills.
Circulatory

Excretory
NERVOUS SYSTEM

- Differentiated Brain
- 8-12 pairs of cranial nerves
- Sight more developed than hagfish, and will use it to locate prey/host near the surface or shallow water.
- Has a **pineal eye** located on top of head. *A light sensitive organ which senses diurnal changes.*
Hagfish are **hermaphrodites** and have gonads for both sexes. Will only be male or female but can change from year to year.

Lamprey: Separate sexes.

External fertilization

Females produce on average 230,000 eggs which are adhesive and non-buoyant.

- Great Lakes average is 60,000 eggs. (r or K strategist?)
It is estimated a lamprey in the Great Lakes will kill on average of 18.5 lbs of fish in its lifetime.

Wounds *not always* fatal (especially marine) but can weaken and sicken the host. Sometimes they die later due to secondary infection.
LAMPREY CONTROL IN THE GREAT LAKES

1. TFM: a chemical that kills the larval form of the sea lamprey. Applied in streams usually in 3 to 10 year intervals.

2. Electric Shock: used to kill adult lamprey as they migrate up streams to spawn.

3. Barrier Dams: they are not excellent swimmers and cannot jump to cross dams, thus cannot spawn upstream.

4. Experimenting with using pheromones to attract and catch the lamprey.

5. Experimenting with releasing sterile males into spawning streams, thus interrupting and reducing the amount of reproduction.
- Wood weir with bottom mounted electrodes.
  - Control sea lamprey movement in conjunction with a pumped fish ladder and sea lamprey trap. Allows passage of migrating fish but traps all sea lamprey.

Concrete weir with bottom and side mounted electrodes.

Electric barrier combined with a low head dam to block, trap and remove sea lamprey.
Scientists have artificially made the main component of lamprey pheromones. It is thought that lampreys will spawn up streams where they smell the pheromone being released by the larval form. By releasing the artificial pheromone it is hoped to attract the spawning lamprey into traps where they can be caught. Females are discarded, and males are taken to a lab to be sterilized. Sterilized males are released into natural spawning areas where they will compete with normal males and reduce lamprey reproduction.
GREAT LAKES SEA LAMPREY LIFE CYCLE

Life Cycle of the Sea Lamprey

FREE SWIMMING STAGE 12-20 months
- Migration of mature adults into streams
  - April-June

Larval phase in streams
- Death of spent adults
  - July-August

Sedentary stage 3-17+ years
- Emergence from stream bed
  - September-May

Parasitic phase in lake
- Downstream migration to lakes
http://oceanlink.island.net/oinfo/hagfish/hagfish.html