TOPIC: AND GENERAL CHARATERISTICS AND CLASSIFICATION OF CYCLOSTOMATA,PETROMYZON

LECTURE NO:10

BSC PART 1-PAPER II-GROUP A

DATE: 8TH APRIL 2020

AUTHOR:NIRMAL KUMARI

Life Cycle & Reproduction:

Lampreys are Anadromous or fresh water, eel-shaped jawless fishes. They can be readily recognized by the large, rounded sucker which surrounds their mouth and by their single “nostril” on the top of their head. The skin of Lamprey is entirely naked ans slimy and their seven gill openings extend behind the eyes. Whether marine or fresh water, Lampreys always spaw and lay eggs in brooks and rivers. During most of their life (about

seven years), they are larval then theyundergo a metamorphose and become an adult.

Anadromous lampreys living in freshwater, when adult returns to the sea, where they become mature and live there for one or two years. Then they return to rivers, reproduce and generally die.

Lamprey eggs hatch into small larvae, known as ammocoetes, which are not predators at all; they lack the sucker mouths of the adults, and feed by producing strands of mucus and trapping food particles. The ammocoetes stage may last up to seven years before its metamorphosis into an adult. Adult lampreys live for a year or two before spawning, and then die soon afterwards.

CONTROL OF LAMPREYS:

Since lampreys are parasitic,they are harmfull to the Control efforts, including electric current, chemical lampricides have met with varied success. The control programs are carried out under the Great Lakes Fisheries Commission, a joint Canada–U.S. body, specifically by the agents of the Fisheries and Oceans Canada and the United States Fish and Wildlife Service.Therefore efforts are being made to control them.

Genetic researchers have mapped the sea lamprey's genome in the hope of finding out more about evolution; scientists trying to eliminate the Great Lakes problem are coordinating with these genetic scientists, hoping to find out more about its immune system and fitting it into its place in the phylogenetic tree. Several scientists in this field work directly for Fisheries and Oceans Canada or the United States Fish and Wildlife Service.

Researchers from Michigan State University have teamed up with others from the Universities of Minnesota, Guelph, and Wisconsin, as well as many others in a massive research effort into newly synthesized pheromones. These are believed to have independent influences on the sea lamprey behavior. One pheromone serves a migratory function in that odor emitted from larvae are thought to lure maturing adults into streams with suitable spawning habitat. A sex pheromone emitted from males is capable of luring female's long distances to very specific locations. These two pheromones are actually both several different compounds thought to elicit different behaviors that collectively influence the lamprey to exhibit migratory or spawning behaviors. Effort is being made to characterize the function of each pheromone, each part of each pheromone, and if they can be used in a targeted effort at environmentally friendly lamprey control. Despite millions of dollars put into research, however, the most effective control measures are still being undertaken by control agents of state and federal agencies, but involve the somewhat publicly unacceptable application of TFM into rivers.

Another technique used in the prevention of lamprey population growth is the use of barriers in major reproduction streams of high value to the lamprey. The purpose of the barriers is to block

their upstream migration to reduce reproduction. The issue with these barriers is that other aquatic species are also inhibited by this barrier. Fish that use tributaries are impeded from traveling upstream to spawn. To account for this, barriers have been altered and designed to allow the passage of most fish species but still impede others.

Possible relationships

This taxon is often included in the paraphyletic superclass Agnatha, which also includes several groups of extinct armored fishes called ostracoderms. Most fossil agnathans, such as galeaspids, thelodonts, and osteostracans, are more closely related to vertebrates with jaws (called gnathostomes) than to cyclostomes. Cyclostomes seem to have split off before the evolution of dentine and bone, which are present in many fossil agnathans, including conodonts.

Biologists disagree about whether cyclostomes are a clade. The "vertebrate hypothesis" holds that lampreys are more closely related to gnathostomes than they are to the hagfish. The "cyclostome hypothesis", on the other hand, holds that lampreys and hagfishes are more closely related, making cyclostomata monophyletic.

Most studies based on anatomy have supported the vertebrate hypothesis, while most molecular phylogenies have supported the cyclostome hypothesis.

There are exceptions in both cases, however. Similarities in the cartilage and muscles of the tongue apparatus also provide evidence of sister-group relationship between lampreys and hagfishes. And at least one molecular phylogeny has supported the vertebrate hypothesis. The embryonic development of hagfishes was once held to be drastically different from that of lampreys and gnathostomes, but recent evidence suggests that it is more similar than previously thought, which may remove an obstacle to the cyclostome hypothesis. There is at present no consensus on the correct topology.

Differences and similarities between Myxine and Petromyzon

Hagfish have no spinal cord, while lamprey's have.

Lamprey can survive in both salt water and in freshwater, but hagfish cannot

While lampreys feed on the living, hagfish feed on the dead.

Both hagfishes and lampreys have just one gonad, but this is due different reasons. In hagfishes it is because only a single gonad is developed during their ontogeny, while it is achieved through the fusion of gonads in lampreys.

Unlike jawed vertebrates, which has three semicircular canals in each inner ear, lampreys have only two and hagfishes just one. But the semicircular canal of hagfishes contains both stereocilia and a second class of hair cells, apparently a derived trait, whereas lampreys and other vertebrates have stereocilia only. Because the inner ear of hagfishes has two forms of sensory ampullae, their single semicircular canal is assumed to be a result of two semicircular canals that have merged into just one.

The hagfish blood is isotonic with seawater, while lampreys appear to use the same gill-based mechanisms of osmoregulation as marine teleosts. Yet the same mechanisms are apparent in the mitochondria-rich cells in the gill epithelia of hagfishes, but never develop the ability to regulate the blood's salinity, even if they are capable of regulating the ionic concentration of Ca and Mg ions.

The lamprey intestine has a typhlosole that increases the inner surface like the spiral valve does in some jawed vertebrates. The spiral valve in the latter develops by twisting the whole gut, while the lamprey typhlosole is confined to the mucous membrane of the intestines. The mucous membranes of hagfishes have a primitive typhlosole in the form of permanent zigzag ridges. This trait could be a primitive one, since it is also found in some sea squirts such as *Ciona*. The intestinal epiphelia of lampreys also have ciliated cells, which have not been detected in hagfishes. Because ciliated

intestines are also found in Chondrostei, lungfishes and the early stages of some teleosts, it is considered a primitive condition that has been lost in hagfishes.

****