

S. S. College, Jehanabad

Department: Zoology

Class: M.Sc. Semester IV

Subject: Zoology

Topic: Origin and Evolution of Fishes

Mode of teaching: Google classroom & WhatsApp

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Q/ origin & evolution of fishes:

Introduction — The evolution of fish began about 530 million years ago during the Cambrian explosion. It was during this time that the early chordates developed the skull and the vertebral column, leading to the first Craniates and vertebrates. The first fish lineages belong to the Agnatha, or jawless fish.

Early examples include *Halkierichthys*. During the late Cambrian eel-like jawless fish called the Conodonts and small mostly armoured fish known as ostracoderms, first appeared. Most jawless fish are now extinct, but the extant lampreys may approximate ancient pre-jawed fish. Lampreys belong to the Cyclostomata which includes the extant hagfish and this group may have split early on from other agnathans.

Period of evolution of fish like vertebrates:

~~Ordovician and Silurian Period~~

The earliest jawed vertebrates probably developed during the late Ordovician period. They are first represented in the fossil record from the Silurian by two groups of fish, the armoured fish known as Placoderms, which evolved from the ostracoderms and the armoured Acanthodii (or Spiny Sharks). The jawed fish that are still extant in modern days also

appeared during the late Silurian, the chondrichthyes (or cartilaginous fish) and the osteichthyes (or bony fish). The bony fish evolved into two separate groups, the Actinopterygii (or ray-finned fish) and Sarcopterygii (which includes the lobe-finned fish).

Devonian Period

Devonian Period is called the Age of Fishes. In this period, there was a great increase in fish diversity, especially among the ostracoderms and placoderms and also lobe-finned fish and early sharks. This has led to the Devonian being known as the age of fishes. It was from the lobe-finned fish that the tetrapods evolved, the four-limbed vertebrates represented today by amphibians, reptiles, and mammals and birds.

Events

Extinction of ostracoderms and placoderms

Fish, like

many other organisms have been greatly affected by extinction events throughout natural history. The Ordovician-Silurian extinction event led to the loss of many species. The late Devonian extinction led to the extinction of the ostracoderms and placoderms by the end of the Devonian, as well as other fish. The Spiny sharks became extinct at the Permian-Triassic extinction event, the conodonts became extinct at the Triassic-Jurassic extinction event.

The Ordovician - Paleogene extinction event and the present day Holocene extinction, have also affected fish variety and fish stocks.

Ordovician Period :
Ordovician (485-443 Ma). Fish the world's first true vertebrates, continued to evolve and those with jaws (*Cranthostomata*) family have first appeared late in this period. Life had yet to diversify on land. ~~Arandaspis~~

Arandaspis :
Arandaspis are jawless fish that lived in the early Ordovician period, about 480-470 Ma. It was about 15 cm (6 in) long with streamlined body covered with rows of bony or ossified scales.

Silurian Period :
Silurian (443-419 Ma). Many evolutionary milestones occurred during this period, including the appearance of armored jawless fish, jawed fish, spiny sharks and ray-finned fish. In the Silurian (420 Ma), where among the first fishes to evolve jaws. They search features, with both cartilaginous and bony fish. This both character found in a spiny shark. Spiny shark extinct before the end of Permian (250 Ma).

Evolution of Cartilaginous of bony fishes:

By the start of the early Devonian 419 mya, jawed fishes and divided into four distinct clades, the Placoderms and Spiny Sharks, both of which are now extinct and the Cartilaginous and bony fishes, both of which are still extant. The modern bony fishes class Osteichthyes appeared in the late Silurian or early Devonian about 416 million years ago. Both the Cartilaginous and bony fishes may have arisen from either the Placoderms or the Spiny Sharks. A subclass of bony fishes, the ray-finned fishes (Actinopterygii), have become the dominant group in the post-Paleozoic and modern world, with some 30,000 living species.

Origin of Cartilaginous fish:

Class Chondrichthyes

This class consist shark, rays and Chimerae appeared about in the middle Devonian (about 395 million years ago) involve from an acanthodians. The class contains the sub classes Holocephali (Chimera) and Elasmobranchii (Shark and rays) - and etc. The radiation of Elasmobranchs in the chert on the right is divided into the taxa: Cladoseleache, Eugeneodontiformes, Synbranchia, Xenacanthiformes, Ctenacanthiformes, Hybodontiformes, Galeomorphi, Squaliformes and Botolidae.

Class Osteichthyes

These are characterized by bony skeletons rather than cartilage. They appeared in the late Silurian, about 419 million years ago. The recent discovery of osteolegionids strongly suggests that bony fishes (possibly cartilaginous fishes, via acanthodians) evolved from early placoderms. A subclass of the osteichthyes, the ray-finned fishes (Actinopterygii), have become the dominant group of fishes in the Post-Paleozoic and modern world, with some 30,000 living species.

Conclusion

Fish have descended from ancient groups of fish, but have developed certain features over time. As their environment changes, they need certain features to cope with the environment. For example, if the sponge population began to decrease blue angelfish might develop longer fins to help swim faster.

The type of natural selection fish use is stabilizing. Stabilizing fish with average forms of a trait have highest fitness. Fish with a medium body size will survive easier in their environment. Small fish might have a hard time finding/catching food. Big fish might have a hard time hiding from predators or swimming faster.