

WEEK 2 DEVELOPMENT OF JAWS

Having backbones or vertebrae is a hallmark of being a vertebrate animal. It sets us apart from insects, molluscs, worms, jellyfish. It also unites us with the sharks, goldfish, salamanders, canaries, mice and many more animals. This latter group of animals, including humans, sit on neighboring branches in the tree of life. Some only split away from us in the last several million years whereas some parted from our lineage more than 500 million years ago.

This is one of the earliest vertebrates called *Metaspriggina* from the 500 million year old rocks of Western Canada. I hope you can appreciate its fishlike features but this animal did not have teeth, bones or paired appendages. These structures evolved over time. A great variety of vertebrates appeared in the subsequent hundred million years. Having the characteristic combination of vertebrate features many of them are called Ostracoderms or bony skinned because their body typically had bony armor.

When this initial radiation was underway, the Earth experienced a catastrophe. This is a map of the Earth 440 million years ago. The vast landmass of Gondwana supercontinent over the South Pole resulted in the major glaciation. With a huge amount of water locked up in ice, global sea level dropped dramatically, and the shallow seas disappeared. This cooling event caused Ordovician–Silurian extinction events.

This is the first of the big five mass extinctions in Earth's history and the second most severe. An estimated sixty percent of the existing groups of animals went extinct over the next five million years.

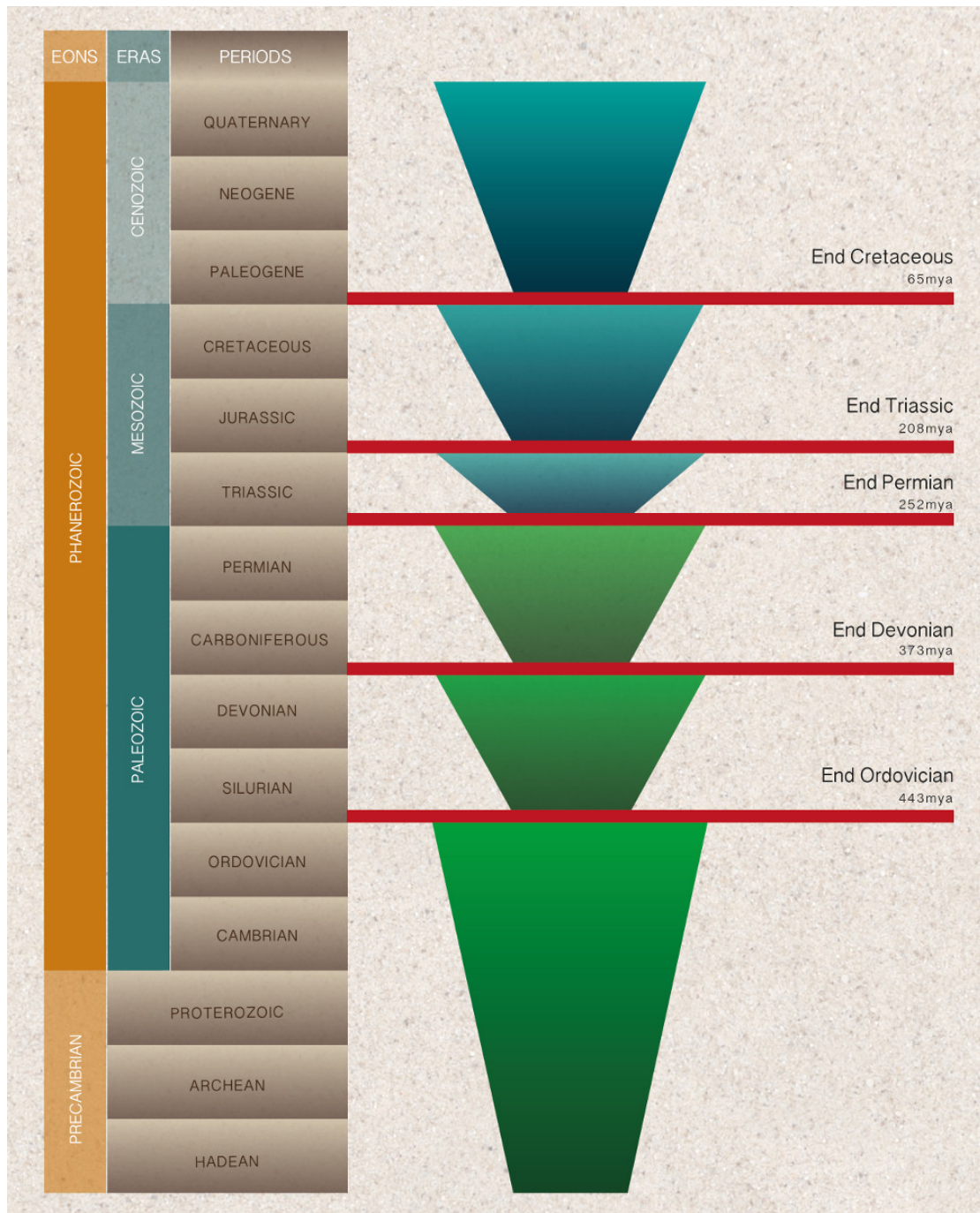
At some point, probably close to the time of the Ordovician-Silurian extinctions, vertebrates evolved jaws. Up until this point all vertebrates were jawless. None of the

Ostracoderms had anything like biting jaws. Most Ostracoderms were small and vertebrates were by no means the top predators but that was about to change.

A jaw is a structure in the mouth composed of two opposing skeletal parts connected by a flexible joint. In vertebrates the sections of the jaw are made of cartilage or bone, one in the upper side and the other in the lower side. This means the vertebrate jaw is made up of an upper jaw and a lower jaw on each side of the head.

Jawed vertebrates are called Gnathostomes, meaning jawed mouth. Having opposable jaws meant that Gnathostomes could catch and eat other animals. This opened up a whole new arena of feeding strategies for the early vertebrates. Being able to secure more and higher quality food confers a huge selective advantage to early vertebrates.

From this point on vertebrates continue to diversify, conquer the sea, land and air and dominated the planet over 400 million years. Thus began the Devonian period also known as the Age of Fishes.



Anusuya Chinsamy-Turan 2017

Unless otherwise stated, this material is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/). This means you are free to copy, distribute, display, and perform the work as long as you attribute the authors of the work.