



Rostral Tooth of an ancient Sawshark

THE ORDER **PRISTIOPHOIFORMES** includes some of the strangest looking sharks alive today, collectively referred to as **Sawsharks**. Sawsharks have an elongated snout called a **rostral saw**, which has “teeth” that give it the appearance of a hand-saw.

The rostral saw may look rather menacing, but Sawsharks primarily feed upon fish and crustaceans. Sawsharks will wave their saw back and forth, stirring up hard-bodied prey from the substrate, or stunning fish with the **rostral teeth**.

The interesting thing about these sharks is that they have oral teeth along with rostral teeth. The oral teeth of Sawsharks are crushing-type teeth, making them well adapted for feeding on the seafloor.

Many of the Sawshark species are threatened, and the IUCN (World Conservation Union) stated that Sawfish are **among the most threatened sharks in the world**.

A Closer Look:



Photo by Laura Rosen

SHARKS RETAINED MANY of the same morphological features that they possessed millions of years ago. However, evidence of sharks in the fossil record is rare because members of the class Chondrichthyes have a cartilaginous skeleton rather than a bony one. While cartilage preserves poorly, teeth preserve well, and are used as a diagnostic tool by paleontologists who study shark lineage. Teeth are the major fossil type of shark fossil because of their hard composition of enameloid and dentine. By looking at shark teeth in the fossil record, we can decipher information about the numbers and diversity of prehistoric shark populations.

The first shark fossils date back to the Silurian period around **420 million years ago**. The Silurian sharks are known only from fossil scales, which suggests that they did not have much dentition. The greatest radiation of shark species occurred 355 million years ago in the Carboniferous period. At this time sharks had well developed teeth and different tooth types. Some sharks of the Carboniferous had dermal spines or strange, bony dorsal spines. The spines were most likely used as a defense against large predatory fish of the time. Most of the Carboniferous sharks were also smaller in size than modern sharks.

The largest shark known to have existed is the modern **Whale Shark** which measures 18 meters in length. Although the Whale Shark is large, it is a non-predatory filter feeder. The largest predatory shark went extinct about two million years ago. *Carcharocles megalodon*, an ancestor of the modern **Great White Shark** (*Carcharodon carcharias*), is estimated to have reached lengths of up to 13 meters. The teeth of *Carcharocles megalodon* alone can be 18 centimeters in height.

Background: Preserved Shark vertebral disk.

The Evolution of Shark Dentition

Sharks Surviving in a Modern World

SHARKS HAVE BEEN an essential part of the oceanic ecosystem for millions of years, but they now face their most difficult challenge—the influence of human beings. Sharks continue to be demonized based on stereotypes about sharp teeth and violent hunting style, although the majority of sharks worldwide do not fit this description. There are many sharks that do not have sharp teeth whatsoever, and even more sharks that hunt prey only a fraction of the size of humans. Fear has played a major part in the decline of sharks throughout human history. Today there are efforts to change the general public's perception of sharks by educating adults, and more importantly, children.

Ignorance is the worst enemy of sharks today. Overfishing and “**finning**” have had the most dramatic effect upon shark populations. Finning is the act of cutting off a shark's fins and dumping the rest of the animal back into the water. The sharks then drown because they cannot swim without fins and cannot breathe without swimming. Their fins are used to make a Far East delicacy and supposed aphrodisiac known as shark fin soup. Besides the moral issue of dismembering live animals, finning is detrimental to shark populations because poachers only require the fins. By only taking the fins, 95 to 98 percent of the animal is wasted, and because of the demand for shark fin soup, many sharks must be taken.

Overfishing of sharks for meat is a problem throughout the world, although often sharks are not the targeted catch. Many sharks become **bycatch** of fisherman and commercial fishing nets. Sharks a vital part of the marine ecosystem, and they function as **keystone species**. Keystone species support the entire ecosystem in which they live, and if they were to disappear the system's balance would be thrown off. Sharks are the major predator of the ocean, and without sharks, their prey items would flourish and overwhelm other organisms.

Sharks are fascinating animals that have developed specialized tooth types which are perfectly equipped for specific feeding modes. Because of the dentition types, sharks can fill a variety of niches in the marine ecosystem. Slight modifications throughout their history have allowed them to become a dominant animal in the ocean. The presence of humans has been the greatest cause of adversity to shark populations.

“...by the skin of their teeth.”

Sharks of the world are in danger, and steps must be taken to conserve and protect these amazing animals. Education is the best friend sharks have in the modern world. Further legislation to outlaw impractical acts such as finning is a must for the survival of sharks. Creatures with such an ancient past should be treated with respect. Sharks continue to be harvested and hunted to this day, and before long they really will be hanging on by the skin of their teeth.

Works Cited

- Bright, M. Sharks. Washington, D.C.: Smithsonian Institution Press, 2002.
- Carrier, J.C., ed., J.A. Musick, ed., & M.R. Heithaus, ed. Biology of Sharks and their Relatives. Washington D.C.: CRC Press, 2004.
- Carwardine, M., & K. Watterson. The Shark Watcher's Handbook. Princeton & Oxford: Princeton University Press, 2002.
- Compagno, L. M. Dando, & S. Fowler. Sharks of the World. Princeton & Oxford: Princeton University Press, 2005.
- “Education: Biological Profiles.” Florida Museum of Natural History Ichthyology Department. 2006. University of Florida. <http://www.flmnh.ufl.edu/fish/Education/biopofile.htm>
- Fowler, S. L., ed., T. M. Reed, ed., & F.A. Dipper, ed. Elasmobranch Biodiversity, Conservation Management: Proceedings of the International Seminar and Workshop, Sabah, Malaysia, July 1997. Oxford: Information Press, 2002.
- Kent, B. W. Fossil Sharks of the Chesapeake Bay Region. Columbia, MD: Egan Rees & Boyer, Inc., 1994.
- Long, J. The Rise of Fishes: 500 Million Years of Evolution. Baltimore & London: The Johns Hopkins University Press, 1995.
- Matsen, B., & R. Troll. Planet Ocean: Dancing to the Fossil Record. Berkeley: Ten Speed Press, 1994.
- Tricas, T.C., ed., & Gruber, S.H., ed. The Behavior and Sensory Biology of Elasmobranch Fishes: An Anthology in Memory of Donald Richard Nelson. Dordrecht: Kluwer Academic Publishers, 2001.

