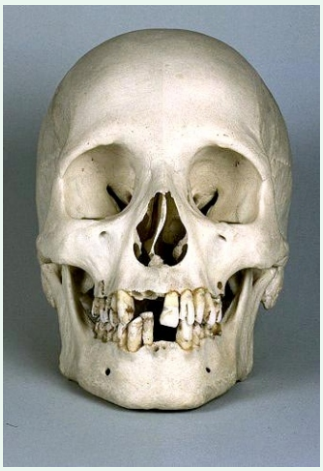
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SKULLS AND TEETH Z18



The skull or cranium is a bony structure found in many animals which serves as the general framework for the head. Animals which have skulls are sometimes referred to as craniates. The skull has a number of functions, including protecting the brain, maintaining a fixed distance between the eyes which is essential for stereoscopic vision, and a fixed position for the ears to help the brain to judge the direction and distance of sounds. The skull also serves as a mount for the teeth and jaws, to permit eating, and in some animals (deer and sheep, for example) the skull can have a defensive/aggressive function, having a frontal bone where horns are mounted.

Teeth are found in the jaws of many vertebrates (animals with backbones). The primary function of teeth is to tear and chew food, although in some animals they are also used for fighting and/or defence. The roots of the teeth are covered by gums.

The shape of the teeth is related to the animal's diet. Carnivores (meat eaters), for example, have all their teeth with very narrow points or edges and no grinding surfaces; omnivores, those feeding equally on plants and animals, have the front teeth (incisors) wedge shaped and the rear teeth (molars) with broad grooves and crowned surfaces. Ungulates (hoofed animals) have wide molars with multiridged patterns, and rodents have continuously growing incisors and highly variable molar patterns. Greatly modified teeth are conspicuous in the tusks of walruses, elephants, and narwhal.

In mammals, teeth vary in number from 0 in the anteaters, to 50 in the opossum and 100 small ones in the giant armadillo. Each mammal species has a specific total number of permanent teeth as well as a distinctive number of certain kinds of teeth such as incisors, canines, premolars, and molars.

While humans develop two sets of teeth throughout life, some animals develop only one set or many. Some sharks, for example, grow a new set of teeth every two weeks. Teeth are lacking in birds but modifications such as hooks, notches, and serrations of their beaks serve to function as an alternative.

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Shark Teeth



The teeth of carnivorous sharks are not attached to the jaw, but are embedded in the flesh and in many species are constantly replaced throughout the shark's life. Some sharks can lose 30,000 teeth in a lifetime. All sharks have multiple rows of teeth along the edges of their upper and lower jaws. New teeth grow continuously in a groove just inside the mouth and move forward from inside the mouth on a 'conveyor belt' formed by the skin in which they are anchored. In some sharks rows of teeth are replaced every 8 to 10 days, while in other species they could last several months. The lower teeth are primarily used for holding prey, while the upper ones are used for cutting into it.

Gibbon Skull



Gibbons are the small apes that live in tropical and subtropical rainforests from northeast India to Indonesia and north to southern China, including the islands of Sumatra, Borneo and Java. Gibbon skulls resemble those of the great apes, with large orbits (eye sockets) that face forward. Their teeth are similar to the great apes also, with prominent canines. It is not known which species of gibbon this skull belonged to. It lacks its lower jaw and the long, sharp canines are missing.

Right: a lar gibbon

Rhinoceros Tooth



All rhinos are herbivorous and this tooth shows the characteristic grinding surface common to animals with this diet. Rhinos have 24 to 34 teeth, mostly premolars and molars for mashing up leaves. The canine and incisor which all species possess have largely lost their function, although the lower incisors in Indian rhinos have developed into powerful slashing tusks. In fact, the incisors of the Indian rhinoceros are its main means of defence, much more dangerous than the horn on the nose.

Elephant Teeth



Unlike most mammals, which grow baby teeth and then replace them with a permanent set of adult teeth, elephants grow several sets of teeth throughout their entire life. After one year the tusks (which are used to dig for water and roots, to debark and move trees and occasionally as weapons) are permanent, but the other teeth are replaced five times in an elephant's life.

The teeth do not emerge from the jaws vertically as with human teeth. Instead, they have a horizontal progression, like a conveyor belt. New teeth grow at the back of the mouth, pushing older teeth towards the front, where they wear down with use and the remains fall out. This example, from an Indian elephant, shows both the exposed teeth from one side of the jaw and teeth which were developing inside the gums at the back of the mouth.

Elephants spend 20 hours a day snacking and eating. They will eat 200-300 kg of leaves a day and drink up to 100 litres of water. The movement of the elephant's jaw during chewing is forwards and backwards, unlike cows who use sideways movements to chew the cud. The ridges on the teeth act as two rasps grating upon one another.



When an elephant becomes very old, the last set of teeth is worn to stumps, and it must rely on softer foods to chew. Very elderly elephants often spend their last years exclusively in marshy areas where they can feed on soft wet grasses. Eventually, when the last teeth fall out, the elephant will be unable to eat and will die of starvation. Were it not for tooth wear, their metabolism would allow them to live much longer. As more habitat is destroyed and the elephants' living space becomes smaller, the elderly will no longer have the opportunity to roam in search of more appropriate food and will, consequently, die of starvation at an earlier age.

Above: an Indian elephant displays its teeth

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Jackal Skull

Three different jackal species are found in Africa: the golden jackal, the black-backed jackal and the side striped jackal. Another species called the simian jackal is actually a wolf that is thought to have taken on the appearance of a jackal through convergent evolution. It is not known what species of jackal this skull belonged to. Original ink notes on it indicate that it originates in East Africa and dates from 1909.



Above: a black-backed jackal

Jackals are opportunistic omnivores. They cooperatively hunt small or young antelopes and also eat reptiles, insects, ground-dwelling birds, fruits, berries and grass. They will pick over kills made by large carnivores and even visit rubbish dumps in pursuit of food. The teeth found in this skull are indicative of this omnivorous diet. It is similar in appearance to that of many species of dog.

Horse Teeth

At five years of age a horse has between 36 and 44 teeth. All horses have twelve premolars and twelve molars commonly known as cheek teeth or jaw teeth. They also have twelve incisors, or front teeth. This example is a molar. Molars are used to grind food - the name is derived from the Latin word mola, (millstone). Both horse teeth in this box are molars.



Above: the upper jaw of a horse

Horse teeth grow continuously until some time between the ages of 25 and 30. Grass, their natural food, contains silica which is an abrasive and which constantly wears down their teeth. A horse living on natural grass will polish off the surfaces of its molars into a level. However, those fed a less fibrous diet chew less and the tooth surfaces do not get polished off evenly. Raised edges may appear along the edges of the molars which can become quite razor-like. A slight unevenness can be seen on the darker of the two teeth. As these conditions develop the horse's teeth are often made level by vets through the use of a dental rasp.

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Whale Teeth



Like all mammals, whales breathe air into lungs, are warm-blooded, feed their young milk from mammary glands, and have some (although very little) hair. Some whales have evolved so that they feed without teeth. Baleen whales use baleen plates (which look like combs of thick hair) for filtering food from water. Toothed whales, on the other hand, have retained their teeth

Except for the sperm whale, most toothed whales are smaller than the baleen whales. The teeth differ considerably between the species. It is not known from which species these two examples were taken. The teeth may be numerous, with some dolphins bearing over 100 in their jaws. At the other extreme is the narwhal with its single long tusk and the almost toothless beaked whales with bizarre teeth only in males. Not all species are believed to use their teeth for feeding. For instance, the sperm whale has 2026 pairs of cone-shaped teeth in its lower jaw, each 8-20 cm (3-8 in) long. Each tooth can weigh as much as one kilogram. However, it is believed that they are not necessary for catching squid (its main food source) and healthy sperm whales have been found in the wild without teeth. The current scientific consensus is that the teeth may be used for aggression between males of the same species.

Heron Skull



The grey heron (*Ardea cinerea)* eats mainly fish, amphibians small mammals, and occasionally birds. It can stand motionless for hours with its neck stretched out, looking for food, or hunched down with its neck bent over its chest.

In birds, the beak is used for food-gathering and processing. This means that the size and shape of a bird's beak is an excellent guide to its diet and general ecology. We can infer quite a lot about a bird's natural history by examining and comparing beaks of different species. The most distinctive feature of this heron skull is the large, dagger-like beak, which is ideal for grabbing its prey. By way of comparison, the photograph beneath it shows the skull of a shoveler duck. This species has a broad, spade-shaped beak lined with hair-like lamellae, which it uses to sift through the water to filter out insects and plant matter. It would be impossible for the shoveler to hunt for quickly moving fish, just as the heron would be unable to extract nutritious material from a mouthful of water.

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Ox Jaw

Oxen are large and heavy set breeds of cattle which have been trained as draft animals. As with the examples of the horse and the rhinoceros, the teeth are adapted for a vegetable diet.



Muskrat Skull

The Muskrat is a large aquatic rodent native to North America and introduced in parts of Europe. Adult body length is usually between 25 and 40 cm long. The body is covered in thick, brown waterproof fur. Muskrats live in wetlands and are very good swimmers, using their tail for propulsion in the water. They are most active at night or near dawn and dusk. They feed on aquatic vegetation, freshwater mussels, frogs, crayfish and small turtles.



Above: a muskrat

The complex design of closed loops and triangles on the grinding surfaces of the molars which can be seen if the teeth are examined closely is often used to identify teeth that are found detached from a skull. Each species of rodent has a different pattern. The photographs below show a porcupine skull (left) and a beaver skull (right) to illustrate some of the variety of patterns.

The bulbous cavity on the rear base of the skull is called the tympanic bulb. It is part of the hearing system of the animal. Such cavities are found on a wide variety of mammal skulls, including dogs and cats. There should be two of the these bulbs, but the skull has been damaged and one is missing.

