

PRIMATE DIET AND DENTITION

Introduction

Teeth, along with the digestive and locomotor system, form an important part of any animal's dietary adaptation. Teeth are the mineral medium through which an animal obtains and begins to process its food and they are designed to resist extensive abuse that their owner subjects them to throughout its lifetime. In the fossil record, soft anatomy is not preserved, but teeth are commonly preserved as fossils (along with the jaw bones) because of their chemical and structural resistance to destruction. In addition, they will survive scavenging by animals and stream transport that totally destroys other skeletal elements. By comparing the teeth of extinct fossil species with the teeth of living species, we can deduce the types of foods that the extinct species ate. In turn, we may determine that species' position in the food web of the ancient community in which it lived. We can even reconstruct an ancient community when nothing but fossil teeth are preserved in a geologic deposit.

Mammalian Teeth and Diet

The majority of mammals, including all the species of primates, have four kinds of teeth: *incisors*, *canines*, *premolars*, and *molars*.

Incisors are located at the very front of the mouth and are flattened front-to-back and are used by most mammals to nip food, although rodents have long, ever-growing incisors, designed for gnawing. Some herbivores, such as deer and cattle, have lost the upper incisors.

Canines are positioned immediately **posterior** (in back of) the incisors. One canine is present on each side of the upper and lower jaws. (Many omnivorous and herbivorous mammals have small canines or have lost them through evolutionary tooth reduction). Canines are long, conical, pointed and usually longer than (that is, projecting beyond) the other teeth. Canines serve many functions, such as grasping, stabbing, ripping, and tearing food, and playing a role in defense and displays of dominance (e.g., among the baboons with their amazing "yawn" threat display).

Premolars (along with the molars) are often called the cheek teeth and are used for chewing, crushing, and grinding. They lie immediately posterior to the canines. They are simple teeth that usually have two cusps (the elevated portions, or bumps, on the chewing surfaces). In carnivores (meat-eaters, such as cats and dogs), the premolars are usually four blade-like teeth, flattened from side-to-side, which serve to slice through the meat and tendons of their prey. Herbivores (grazing animals, such as horses and cows), on the other hand, have premolars whose crowns tend to wear to flat grinding surfaces and resemble the more posterior molar teeth. Omnivorous mammals (who eat all types of foods, such as pigs and humans) display premolars having a shape in between that of carnivores and herbivores. Premolars are usually, but not always, slightly smaller and simpler in cusp patterns than the molar that follow them. They are distinguished from molars because premolars are deciduous. That is, there is a milk set that is later replaced by an adult set. Molars are not replaced; they exist only as adult teeth.

Molars are the most posterior teeth in the jaws of most (but not all) mammals. As with premolars, they vary tremendously in size, shape and function. The completion of their eruption is usually delayed until the individual reaches near adult size. Molars are the most complex teeth in structure due to the formation of several cusps and minor cusps, ridges, and valleys. The molars chew, crush, grind and prepare food for

passage to the stomach for digestion (The smaller food particles, the greater the surface area per volume upon which the digestive enzymes can act).

In carnivores, molars are much flatter and broader crowned than the premolars. Although placental mammals may have up to three molars, some carnivores possess only one or two in each jaw. Domestic dogs have three lower, but only two upper molars. Herbivores and omnivores generally display three flat-wearing molars having a somewhat square (in the upper jaw) or rectangular (in the lower jaw) outline. The difficulty many humans have in successfully erupting their third molars (“wisdom teeth”) without help from a dental surgeon, may be fore-shadowing an evolutionary loss of that tooth position in our species.

Dental Formulas

The types and numbers of teeth that typifies a species are designated in **dental formulas**. Since dentition is **bilaterally** symmetrical, we need only note the numbers and kinds of teeth on one side of the jaw. When writing a dental formula, the teeth of the maxilla (upper jaw) are written first, and those of the lower jaw follow.

For example, all Old World **anthropoids** (monkeys, apes, hominids) have two incisors, one canine, two premolars, and three molars on **each side of the midline** in **both** the upper and lower jaws, or a total of 32 teeth. This is represented as a dental formula of:

$$2.1.2.3 \text{ (upper)} / 2.1.2.3 \text{ (lower)}$$

A dental formula can also be written like this:

$$\frac{2.1.2.3 \text{ (upper)}}{2.1.2.3 \text{ (lower)}}$$

