

PROBOSCIDEA

Taxonomy

The order Proboscidea contains one living family, Elephantidae, containing two living species in two genera: *Elephas maximus* of southern Asia and *Loxodonta africana* of Africa.

Introduction

Proboscidea is named for its most prominent characteristic, the trunk (Latin proboscis). The order is further distinguished from all other terrestrial mammals by its unusual dentition and massive body size.

Evolution

The Elephantidae are the last of this mammalian order, which once enjoyed widespread distribution and included mastodons and mammoths.

The first known specimens of Elephantidae are from the late Miocene or early Pliocene deposits in Africa. *E. maximus* developed in Africa at this time and spread through Eurasia during the middle and late Pliocene. They became restricted to Asia by the late Pleistocene. *L. africana* developed in Africa only during the middle Pliocene.

Physical and Behavioral Adaptations

The trunk of the family Elephantidae is an elongation of the nose and upper lip with the nostrils at the tip. It performs important functions such as breathing, gathering food and water, touching, vocalizing, and it is also used for defense. At the tip of the trunk there is a projection, which is used like a finger to grasp small objects. The African elephant has two such finger-like projections while the Asian has only one.

The ears of an elephant are large: very large on the African species and smaller on the Asian. Since the proboscideans have no sweat glands, the ears are used to help maintain body temperature. There are many small blood vessels in the ears; in hot temperatures, they are fanned to provide more surface area to cool the animal.

The columnar legs are heavy and the feet are short, broad, and plate-like with four or five digits on each foot depending on the species.

Proboscideans are vegetarians. The type of food consumed depends upon the season: grasses and herbs during the rainy season; woody plants during the dry season. An elephant consumes 4% to 6% of its body weight, as much or more than 225 kg (500 lbs.) of forage, daily. Digestion in elephants is very inefficient, assimilating only 44% of its food intake.

Proboscideans bear young that are able to stand shortly after birth. The baby is able to follow its mother in her daily routine within a few days. The baby is nursed and cared for by its mother, and it is completely dependent on its mother for milk for at least the first year. There are baby-sitters called

"aunties" or "all-mothers" that provide reliable care and family support and security. The aunties are usually aunts, older cousins, or siblings of the youngster.

Skeleton

Being the largest of the terrestrial mammals, the elephant needs an extremely sturdy skeletal framework. The neck is short and muscular, thus reducing the strain from head movements. The skull is foreshortened and extends upward providing the leverage required to carry the heavy trunk. The body is long and massive, the tail moderate in length. The back of the Asian elephant is convex, while the back of the African elephant is concave. The limbs are long, massive and columnar. The limb bones lack narrow cavities and are filled with spongy bone instead.

Dentition

The dental formula of Elephantidae is (I 1/0, C 0/0, P 3/3, M 3/3) x 2 = 26. The single upper incisor is enlarged into a tusk and grows continuously. During its life span the elephant has six sets of molars. These grinding teeth increase in size and in number of ridges from front to back. Each molar is replaced from the rear of the jaw as it wears away.

Skin

Pachydermata, the old name for order Proboscidean, refers to their thick skin, which although thick, is a sensitive organ system and contains a rich nerve supply. Wallowing in mud protects the skin from ultraviolet radiation, insect bites, and moisture loss. Frequent bathing and blowing dirt or sand over their bodies provide further protection to the skin. The skin is usually gray in color, but, as the animal grows older, it might undergo some level of de-pigmentation apparently controlled by nutrition, habitat and genetics. This loss of color occurs on and around the ears and forehead of the elephant.

Glands

Elephants lack the usual mammalian sweat glands. There are temporal glands located on each side of the head between the eye and the ear, which produce an oily secretion on the cheeks during the rutting and birth seasons. This is also referred as the "musth gland". Unlike other mammals, elephants lack sebaceous glands that would normally supply oils to protect the skin. Elephants have mammary glands which are two nipples located just behind the front legs. The testis of the male elephant do not descend and remain permanently within the abdomen.

Sensory Organs

The eyes are small, and the vision is moderate. Hearing is acute. The trunk possesses both the sense of touch and of smell.

Behavior

Elephants live in a matriarchal society of related females led by the oldest and usually the largest female. Herds range in size from ten to thirty cows and young. Females lead a social existence surrounded by close relatives and are always in the company of other elephants. The males leave the herd at puberty and generally lead solitary lives. They might temporarily join a bachelor group or another family of elephants, but they do not develop close bonds.

Locomotion

The elephant has two gaits, the walk and the amble. The walk can be slow or fast, forward or backward. The amble is accomplished by lifting two feet on the same side at the same time. In either gait, there is at least one foot on the ground at all times. The elephant can run and swim at times as fast as humans.

Communication

- Tactile** Elephants touch in many ways. They greet one another by stroking with their trunks. All ages and both sexes touch mouths, temporal glands, and genitals during meetings or as a response to excitement.
- Visual** Posturing by elevating the head and fanning the ears to give the impression of larger size is a threatening stance. Visual communication can be deceiving, since many of the actions taken as threatening may just be normal behavior.
- Acoustic** Acoustic communication has the advantage of long distance communication and at the same time the signals can be localized in time and space. The recipient does not need to face the signaler in order to receive the communication. There are a variety of vocalizations, such as trumpeting, rumbling, bellowing, and squealing or screaming. The different degrees of the sound level give the elephant a wide repertoire of sounds for rather sophisticated communication. In addition, there are infrasonic calls made by elephants that are too low in pitch for humans to hear.
- Chemical** Elephants are continually aware of scents that are windborn and rely upon chemical signals to ascertain the presence of any type of danger. The presence, emotional, and psychological states of herd members is also communicated through chemical means. Elephants frequently touch each other's mouth, temporal gland, genitals, urine and dung for chemical cues. The female can tell if a male is in "musth" by smelling an adult male's urine. The male can tell whether a female is in estrus by smelling the female's urine or vulva. The fluid released by the temporal gland can signal the level of excitement in the female and the male elephant. They sometimes rub their temporal glands against tree trunks to leave scent marks.

Courtship and Young

Elephants are polyestrus and births can occur at any time of the year. The female is sexually mature at about nine to twelve years old, while the male becomes sexually mature at about thirteen years. The gestation period is approximately twenty-two months. The interval between calves can be four to nine years depending upon nutrition and population density. There is usually only a single birth. When a male ascertains that a female is in estrus by smelling her urine and vulva, he follows her away from the herd until she is receptive. They remain together apart from the group and copulate many times. The female returns to the herd alone. The baby is born with a copious amount of hair on its head and back, weighs about 200 pounds, and stands about 3 feet tall. Eyesight is poor, and the newborn is totally dependent upon its mother and relatives for care and protection.

Status and Conservation

Both species of elephants have been reduced in number, due to human population growth, associated destruction of elephant habitat, and the ivory market.

The African elephant once ranged throughout the African continent but is today extinct in North Africa.

In 1989 CITES voted to ban the worldwide trade in ivory. Two or three small African countries have now been allowed to resume trading ivory. However, the trading is very limited.

Sources:

Estes 1991; Grzimek 1990; Nowak 1991; Shoshani, et al 1992.

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