Mammalogy

Adaptation, Diversity, and Ecology

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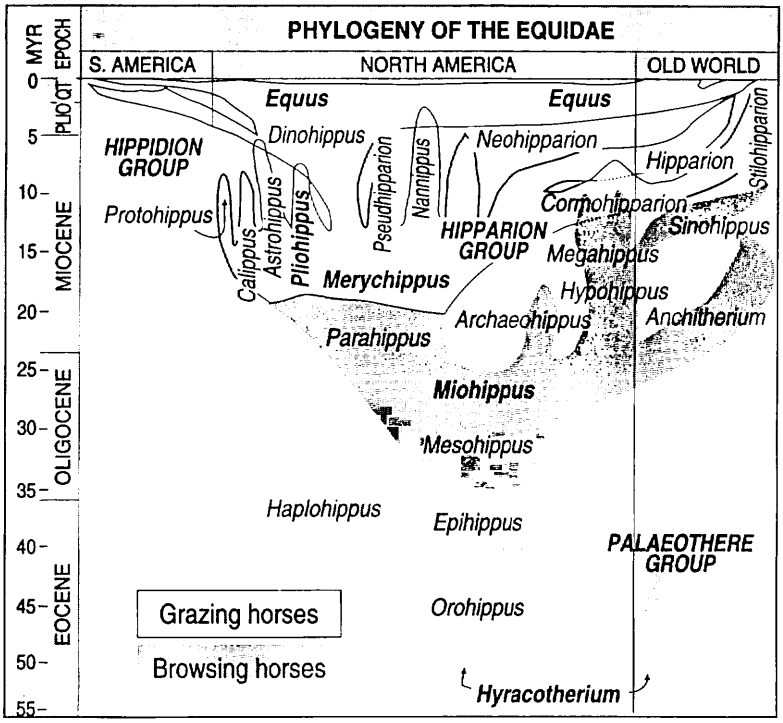


Figure 19.5 Lineages of the horse. Phylogeny of the horse was complex, with overlapping and divergent adaptive radiations.

never far from water. The basic social unit family group, generally 10 to 15 individual up of a highly territorial male, several femal their offspring (Berger 1986). Young femal the family group when they become sexual ture at about 2 years of age. Young males l sexually mature at the same age. They do no until they leave the family group and gain to other females, which is by about 5 years In the plains zebra, temporary aggregati 100,000 individuals may form, depending c logical conditions.

A single offspring is usual after a ge period of about a year. Birth and subsequer ing 7 to 10 days later occur during the wet when vegetation is most abundant. Neona precocial. They begin to graze at about 1 m age and are weaned at 8 to 13 months of ag

Several species of equids are enda These include Przewalski's horse (*Equus p skii*), although this may be a subspecies of t mestic horse (Bennett 1980), and the Afric both of which probably are extinct in the wil onager, sometimes considered a distinct spec *onager*), is endangered, as is Grevy's zebra, v the mountain zebra and the Asiatic ass (*E. he* are threatened. The quagga (*E. quagga*) of Africa, uniform in color on the posterior and on the anterior, became extinct in 1872.

Families

Equidae

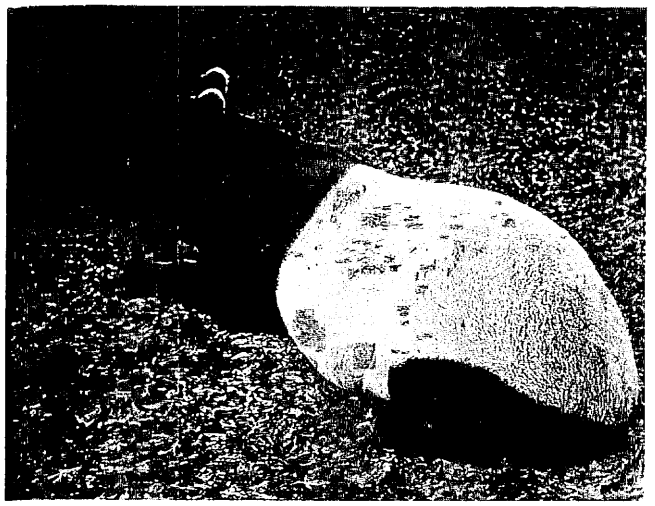
The number of extant equid species is open to question (Corbet 1978; Bennett 1980; Groves and Willoughby 1981), but Grubb (1993a) recognized eight species, all in the Genus *Equus*. All have long, slender limbs, and only the third digit remains functional. Three upper and lower incisors occur in each quadrant, and the cheekteeth are large, hypsodont, and have complex occlusal surfaces. Pelage color is variable in most equids, although the pattern of stripes in zebras depends on the species. Stripes are narrow and close together and extend down to the hooves in Grevy's zebra (*E. grevyi*). The mountain zebra (*E. zebra*) has broad stripes that do not extend to the ventral surface. The plains zebra (*E. burchellii*) has a variable pattern, generally with broad stripes posteriorly that become narrower anteriorly. The neck mane on most equids is erect; it falls to the side only in the domestic horse (*E. caballus*). The body mass of wild equids ranges from about 250 kg in the African ass (*E. asinus*) to 400 kg in Grevy's zebra. The body mass of domestic horses may reach 1000 kg.

The natural distribution of equids includes eastern Africa and central Asia from the Middle East to Mongolia. They inhabit short grasslands and desert scrublands and are

Tapiridae

There are four species in the single Genus *Tapirus*. Th ily has a discontinuous distribution: Baird's tapir (*T.* occurs in Mexico, Central America, and northern America; and two other species, the Brazilian tapir (*restris*) and the mountain tapir (*T. pinchaque*), occur in ern South America. The Malayan tapir (*T. indicus*) oc Myanmar (Burma), Thailand, Malaya, and Sumatra. have a chunky body with short legs and an elongate with small eyes and ears (figure 19.6A). The nose and lip form a pronounced, flexible proboscis. Mean he body length is 180 to 250 cm, and body mass reac much as 300 kg. Pelage color in New World species is form reddish brown to gray or black. The Malayan t white on the trunk of the body and black on the head, ders, and limbs. A short, bristly neck mane is charac of both Baird's and the Brazilian tapir; the hide is very in all species.

Tapirs inhabit heavily forested areas. The mo tapir lives at elevations of 2000 to 4500 m; the other range up to 1200 m. All tapirs are nocturnal and feed derstory shoots, twigs, fruit, grass, aquatic vegetatio occasionally on cultivated crops. All but the mountai are associated with swamps, rivers, or other wet areas are good swimmers and feed or seek refuge in water.



A

B

C

Figure 19.6 Representative perissodactyls. (A) Malayan tapir and (B) black rhinoceros. (C) The rhino skull shows the typical elongated nasal bones without any horn core or attachment site for the horns. Scale: pencil = 16 cm.

Tapirs are generally solitary. Sexual maturity is reached at 3 to 4 years of age. Breeding occurs at any time during the year (Padilla and Dowler 1994). Usually, a single young is born after a gestation of about 395 days. Young have a reddish brown coat and are camouflaged with white spots and lines. They stay with their mother for 6 to 8 months, by which time the juvenile pelage is replaced with adult pelage. All species of tapirs suffer from loss of habitat due to logging, agriculture, and forest clearing and are declining in number and distribution. New World species are hunted for meat and hides. The Malayan tapir is considered endangered.

Rhinocerotidae

There are four genera in this family, with five living species. Rhinoceroses are well known for their large, heavyset, graviportal structure (see figure 19.6B). They have small eyes and a prehensile upper lip that extends past the lower lip in black (*Diceros bicornis*) and Asian rhinos. The upper lip is used to gather vegetation. The white rhino (*Ceratotherium simum*) reaches 400 cm at the shoulder, with maximum body mass of 1700 kg. Body mass of adult male Indian or one-horned rhinos (*Rhinoceros unicornis*) may be 2000 kg (Dinerstein 1991).

The family name refers to the rhino's horns, which have no bony core or keratinized sheath (figure 19.7A) but instead are a dermal mass of agglutinated, keratinized fibers (fused hairs). They are conical, often curve posteriorly, and may reach 175 cm in length in the white rhino. Asian rhinos have shorter horns. The anterior horn is positioned medially over the nasal bones. If two horns occur, the shorter, posterior one is over the frontal bones. Neither horn is attached to the bone, however, but to the skin over a roughened section of the skull bones. The nasal bones of the skull are large and project well above and anterior to the maxillae (see figure 19.6C).

Both white and black rhinos are found in sub-Saharan central and east Africa. The Indian rhino occurred in Pakistan and northern India, and the Javan rhino (*Rhinoceros sondaicus*) originally was in southeastern Asia from eastern India to Vietnam, Sumatra, and Java. The Sumatran, or hairy, rhino (*Dicerorhinus sumatrensis*) also originally was distributed throughout southeastern Asia, Sumatra, and Borneo. The geographic range of all species is greatly reduced to tropical and subtropical habitats due to human interference, poaching, and habitat destruction. Depending on the species, they occupy tropical rain forests, floodplains, grasslands, and scrublands. All are dependent on a permanent water supply for frequent drinking and bathing. Wallowing probably is necessary to help control body temperature (Owen-Smith 1975) and to reduce insect harrassment. Rhinos forage on woody or grassy vegetation and occasionally fruits but prefer leafy material when available.

Aside from mother-and-offspring pairs, rhinos generally are solitary. Small groups of immature individuals may form in Indian and white rhinos. Females become sexually

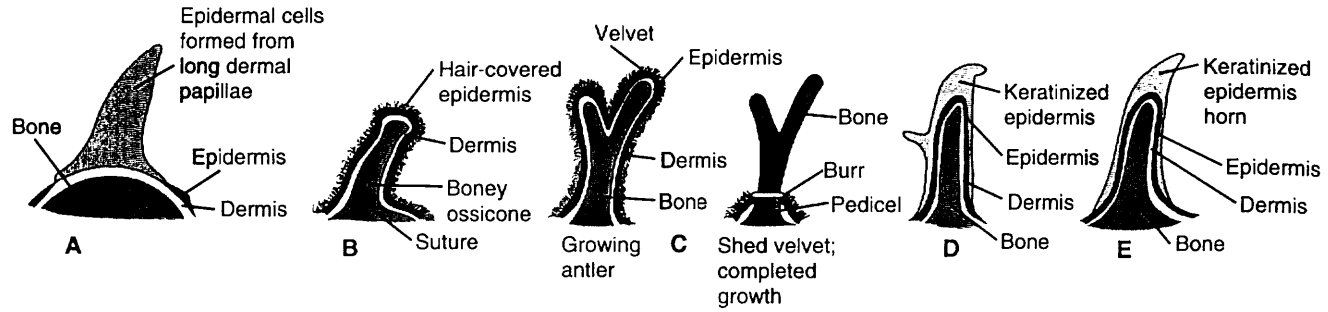


Figure 19.7 **Head ornamentation in five ungulate families.** (A) Rhinocerotidae, a perissodactyl, and four families of artiodactyls: (B) Giraffidae; (C) Cervidae; (D) Antilocapridae; and (E) Bovidae.

mature at 5 years of age and bear their first calves when 6 to 8 years of age. Gestation is about 8 months in the Sumatran rhino and about 16 months in the other species. Births, usually a single calf, occur at intervals of 2 to 4 years (Dinerstein and Price 1991). Young nurse for 1 to 2 years, although *Ceratotherium simum* begins to eat solid food by 1 week of age. Males generally do not breed before 10 years of age (Ryder 1993).

Populations of all species have declined during the last 150 years. As is the case with many large mammals, the quantity of forage required and low reproductive rates mitigate against recovery if populations are reduced. All species are considered to be endangered, with the Asian species near extinction. Rhinos are illegally harvested for their horns (figure 19.8), which, with other body parts, are valued in traditional Asian medicine for supposed aphrodisiac and medicinal properties. Horns also have been used traditionally for making dagger handles in the Middle East. White rhinos have been successfully translocated to parts of their former range in southern Africa.

Figure 19.8 **Poaching for horns.** In the past, illegal rhino horn sold for tens of thousands of dollars a kilogram.

ARTIODACTYLA

Artiodactyls are much more selective feeders than perissodactyls, a factor in their greater adaptive radiation. In contrast to the 3 families and 17 extant species of perissodactyls, the artiodactyls include 10 living families, 80 genera, and approximately 220 species. Artiodactyls are distributed almost worldwide, either naturally or through introduction. As might be expected in such a large group, there is tremendous diversity in body size and structure, and three suborders are recognized. The Suborder Suiformes includes three families: the Suidae (pigs and warthogs), the Tayassuidae (peccaries), and the Hippopotamidae (hippopotamuses). The Suborder Tylopoda includes one family: the Camelidae (camels, llamas, and vicuña). Six extant families make up the Suborder Ruminantia: the Tragulidae (chevrotains, or mouse deer), the Giraffidae (giraffe and okapi), the Cervidae (deer), the Moschidae (musk deer), the Antilocapridae (pronghorn), and the Bovidae (antelope, bison, goats, sheep, etc.). All ruminants, with the exception of chevrotains and musk deer, have some type of head ornamentation in the form of horns or antlers. Despite the vast array of species, artiodactyls share a common morphological characteristic that defines the order.

Morphology

Like perissodactyls, the artiodactyls are defined by the structure of the foot. The main weight-bearing axis passes through the third and fouth digits, a condition termed **paraxonic**. The