

ORDER PERISSODACTYLA

Formerly a widespread and dominant group of mammals, this order now comprises relatively few species. The decline in perissodactyl diversity coincided with the proliferation of artiodactyls. Of the living perissodactyls, tapirs and rhinoceroses more closely resemble one another than either resembles horses.

The name Perissodactyla means odd-toed. The forefoot may be even-toed (tapirs have four), but the hindfoot always has an odd number (one or three). Perissodactyls also have an elongate facial region which accommodates a series of large lophodont cheekteeth (premolars and molars are very similar in size and complexity) and provides space for grinding and manipulating food.

Recognition Characters:

1. foot posture unguigrade.
2. "odd-toed"—middle (third) digit of both forefoot and hindfoot larger than other digits and \pm symmetrical in shape.

3. digits usually 1-1 or 3-3 (4-3 in tapirs, but the fourth digit on forefoot is smaller than other three).
4. **femur with a third trochanter** (see Fig. 10A).
5. calcaneus not articulating with fibula.
6. astragalus with pulley-like surface above, flattened below.
7. **alisphenoid canal present.**
8. nasals wide posteriorly.
9. cheekteeth lophodont.

Compare with: Artiodactyla.

Remarks: For information on classification and phylogeny of perissodactyls, see Scott (1941) and Simpson (1945). Radinsky (1966, 1969) also examined the early evolution of perissodactyls. Comparative digestive capabilities of perissodactyls and artiodactyls were examined by Janis (1976) and authors cited therein.

KEY TO FAMILIES OF PERISSODACTYLA

- 1a. One functional digit per foot; mane present, bushy; postorbital bar present; cheekteeth with very complex lophodont pattern **EQUIDAE** (p. 270)
- 1b. Three or four functional digits per foot; no mane; no postorbital bar; cheekteeth with relatively simple pattern of cusps and transverse ridges 2
- 2a (1b). "Horn(s)" present on rostrum; tail tufted at end; skin thick, rough, often with folds; occipital crest well developed; nasals large, not triangular **RHINOCEROTIDAE** (p.274)
- 2b. No "horns"; tail not tufted; skin smooth; occipital crest small or absent; nasals small, triangular **TAPIRIDAE** (p.272)

Family EQUIDAE
(Horses, asses, zebras)

Once widely distributed in the New World, wild populations of these mammals are now restricted to Africa and a few places in Asia (modern horses were introduced into North and South America by man). Equids are characterized by the presence of only one functional digit per foot, each of which is capped by a single symmetrical hoof. The skull is elongate. The orbit and temporal fossa are separated by a bony plate.

Equids frequent grasslands, savannahs, and deserts. Foraging mostly on grasses, foliage, and twigs, they often make seasonal movements in search of new food supplies. Their large upper and lower incisors equip them to forage on plant parts (e.g., stems) too tough for many other ungulates (Bell, 1970; Janis, 1976).

Equids are gregarious and polygamous.

The social system is variable. In mountain and plains zebras (*E. quagga* and *E. zebra*) each group contains a stallion, several females, and their offspring. Grevy's zebras (*E. grevyi*) and wild asses (*E. africanus*) occur in herds of frequently changing composition; often the males become solitary and territorial (Klingel, 1974). Zebras and asses often mingle with other species (e.g., wildebeest, buffalo, and gazelles) at common water sources or feeding places. Females are polyestrous and may breed at any time of the year; they bear one young. Species living in arid places are quite tolerant of dehydration (Schmidt-Nielsen, 1964).

Horses (*E. caballus*) have been domesticated for several thousand years. Along with donkeys (asses) they are used by people for a variety of purposes.

One genus, 7 species; Africa, desert areas of southwestern and eastern Asia.

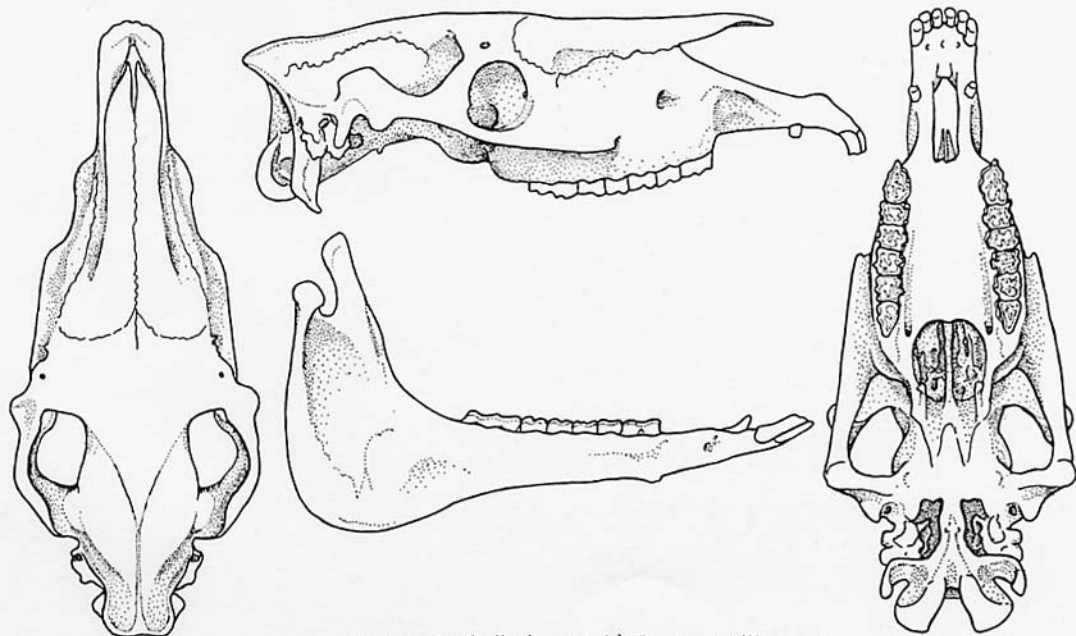


Figure 125. Skull of an equid (*Equus*, x 1/8).

Recognition Characters:

- feet with only one distinct digit.
 - mane present, bushy.
 - orbit enclosed by postorbital bar (continuous with temporal fossa in other perissodactyls) (Fig. 125).
1. body relatively heavy, with long slender limbs.
 2. skin smooth, well haired.
 3. tail long, bushy.
 4. occipital crest small or absent.
 5. nasal long and narrow (Fig. 125).
 6. cheekteeth homodont, all with similar complex lophodont pattern. (Fig. 125).

Dental formula: $\frac{3}{3} \frac{0-1}{0-1} \frac{3-4}{3} \frac{3}{3} = 36-42$

Genus:

Equus (7) - Horses, asses, zebras. The domestic horse is *E. caballus*.

Remarks: Thorough treatments of the evolutionary history of this family were provided by Simpson (1951) and Stirton (1940). General natural history and behavior were explored by Feist and McCullough (1976), Groves (1974), and Klingel (1967, 1968, 1974).

Family TAPIRIDAE (Tapirs)

Living members of this family have an unusual disjunct distribution—they occur only in South America and southeast Asia. Externally, tapirs are recognizable by a short movable proboscis, a short tail, and a rounded body profile which tapers from the back toward front and rear ends. These mammals are the most primitive living perissodactyls—they possess many features in common with the ancestors of perissodactyls (e.g., a large number of relatively simple cheekteeth, short generalized limbs).

These mammals are mostly solitary, nocturnal, and retiring. They inhabit densely vegetated tropical forests, swamps, and savannahs, usually near water.

The diet consists of foliage, twigs, fruit, and green shoots of aquatic and terrestrial plants.

Tapirs apparently breed year-round. A single calf is produced. Young tapirs are dark with yellow and white spots and stripes. This color pattern changes to the more uniform dark color of adults (the Malayan tapir, *T. indicus*, is partly white) within a few months.

One genus, 4 species; tropical areas of Central and South America, and southeast Asia from Burma to Sumatra.

Recognition Characters:

- forefoot with four digits, hindfoot with three.
- snout modified into movable proboscis.

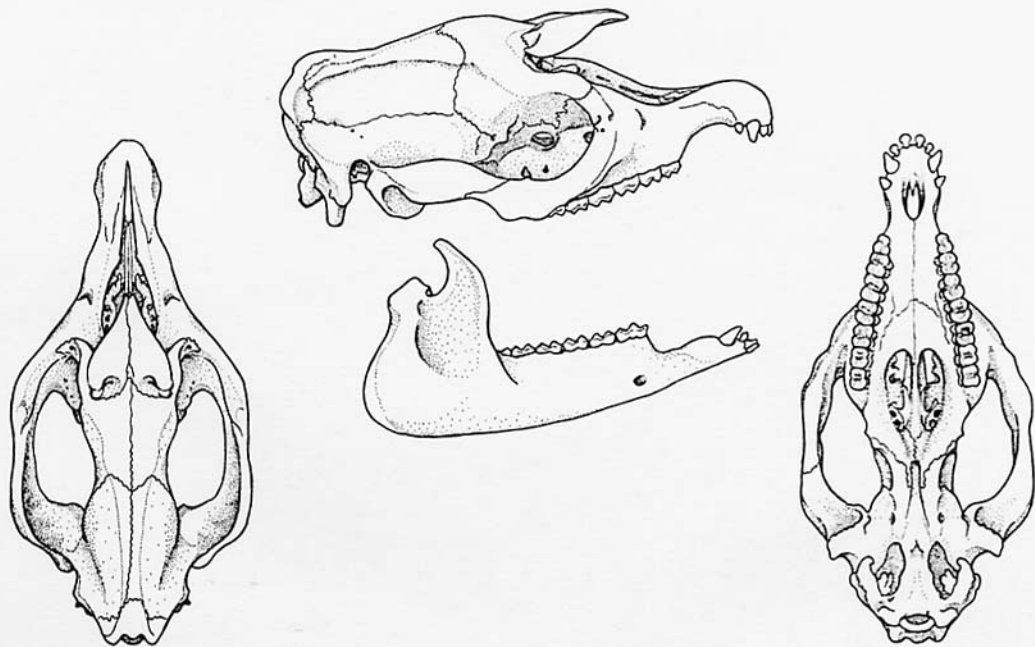
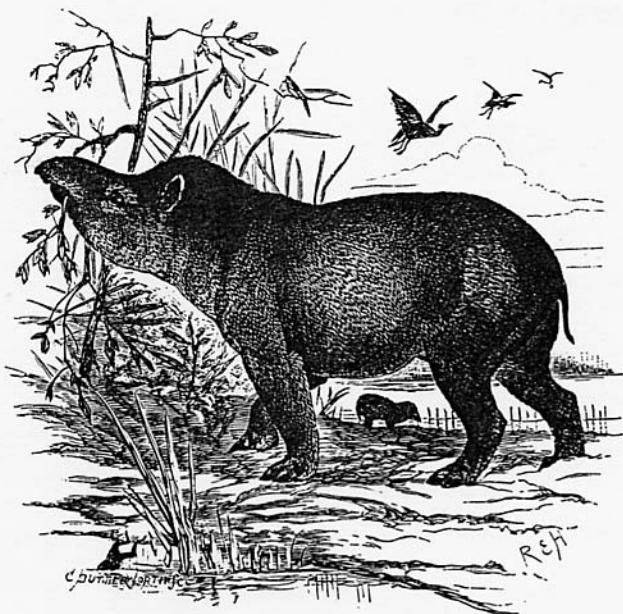


Figure 126. Skull of a tapirid (*Tapirus*, x 1/7).



Tapir.

● **nasal opening of skull very large and recessed** (Fig. 126).

1. body heavy, with short stout legs.
2. skin smooth, sparsely haired.
3. tail short.
4. occipital crest small or absent.
5. **nasal short, triangular** (Fig. 126).
6. cheekteeth not homodont (first premolars do not closely resemble other premolars and molars), simple in pattern (Fig. 126).

$$\text{Dental formula: } \frac{3 \ 1 \ 4 \ 3}{3 \ 1 \ 4 \ 3} = 44$$

Compare with: Rhinocerotidae.

Genus:

Tapirus(4) - Tapirs.

Remark: Bressou (1961) and Radinsky (1963, 1965) studied the anatomy and evolution of tapirs.

Family RHINOCEROTIDAE**(Rhinoceroses)**

The evolutionary history of these large ponderous ungulates parallels that of horses. Both families were formerly far more widespread and diverse than now. Both were also abundant in the New World until the late Pleistocene, when they disappeared. Rhinoceroses have continued to decline in historical time because of exploitation of the animals (horn products are used as an aphrodisiac) or their habitats by man.

Like elephants (p.264), rhinoceroses have pillar-like limbs for support of the heavy body. The skin is thick and tough. In Indian rhinoceroses, it is thrown into several folds forming plates which resemble a knight's armor. All have horns (either one or two) consisting of hair-like filaments cemented together to form a hard compact tissue that grows continuously at the base. The horns have no bony core but are buttressed by the nasal bones (also frontals if there are two horns).

Members of this family inhabit tropical forests, swamps, savannahs, plains, and scrubland, always near water. They are mostly nocturnal or crepuscular. The diet consists of a varied assortment of fruit, twigs, shoots, and foliage (most species) or strictly grasses (*Ceratotherium*). Several species of birds feed on insects and parasites that settle on the skin or are disturbed by the feet of grazing rhinos.

Bull rhinoceroses are solitary and territorial, whereas females occur chiefly in cow-offspring units consisting of fewer than a half-dozen individuals. The bulls temporarily attach themselves to female groups during mating periods. Breeding is seasonal or aseasonal. Females bear a single calf every several years.

Four genera, 5 species; tropical areas of Africa and southeast Asia from eastern India to Borneo.

Recognition Characters:

- **three digits on all feet.**
- **head concave dorsally** (\pm flat in other perissodactyls) (Fig. 127).
- **one or two simple horns located near snout** (other perissodactyls are hornless).
- **temporal fossa exceptionally large** (Fig. 127).
 1. body very heavy, with short stocky legs.
 2. **skin thick, rough, often with folds, scantily haired.**
 3. **tail short, tufted at end.**
 4. **occipital crest well developed** (Fig. 127).
 5. nasals large and heavy for support of horn (Fig. 127).
 6. cheekteeth usually homodont, with relatively simple pattern (Fig. 127).

Dental formula: $\frac{0-2 \quad 0 \quad 3-4 \quad 3}{0-1 \quad 0-1 \quad 3-4 \quad 3} = 24-34$

Compare with: Tapiridae.

Representative Genera:

Ceratotherium (1) - *C. simum* is the square-lipped or white rhinoceros.

Dicerorhinus (1) - *D. sumatrensis* is the Asian two-horned rhinoceros.

Diceros (1) - *D. bicornis* is the black rhinoceros.

Rhinoceros (2) - Indian or one-horned rhinoceroses.

Remark: Useful references on the habits of rhinoceroses include Groves (1967, 1972), Groves and Kurt (1972), Hoogerwerf (1970), Hubback (1939), Owen-Smith (1974), Schenkel and Schenkel-Hulliger (1969), Schenkel and Lang (1969), and Talbot (1960).

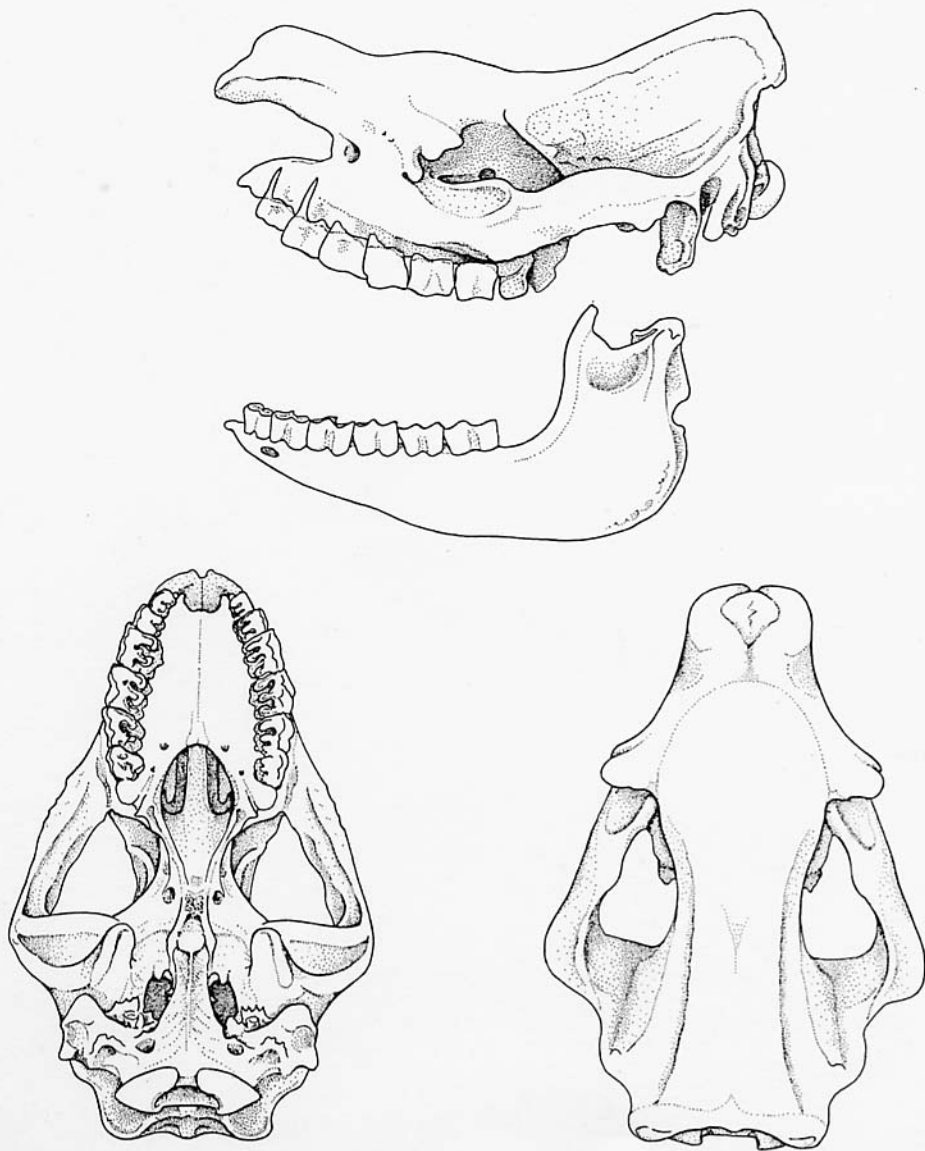


Figure 127. Skull of a rhinocerotid (*Rhinoceros*, x $\frac{1}{6}$).