PERISSODACTYLA

INTRODUCTION TO PERISSODACTYLA (odd-toed ungulates)

Ungulates (meaning roughly "being hoofed" or "hoofed animal") are mammals, which are herbivorous, terrestrial and relatively large in size. Most ungulates use the tips of their toes, to sustain their whole body weight while moving. A hoof is really just a modified toenail. Unlike claws and nails, hooves are the principal point of contact between the legs and the ground. The ungulates consists of two orders: **Perissodactyla** (odd-toed ungulates) and **Artiodactyla** (even-toed ungulates). *Perissodactyla* comes from the Greek meaning odd (*perissa*) toed (*dactyl*). Perissodactyla's weight is borne mostly or entirely by the third toe.

During their evolution these mammals developed hooves instead of claws. The two orders that exist today diverged from a common hoofed ancestor 60 million years ago during the Eocene period. Evolving along a different course the artiodactyls surpassed the perissodactyls in number and continues to thrive, while the perissodactyls are slowly becoming extinct.

TAXONOMY

The Order of Perissodactyla consist of three recent families: **Equidae**, **Rhinocerotidae**, and **Tapiridae** which consists of 17 species in six genera. The middle toe of the perissodactyla is the most developed and they are referred to as odd-toed or odd-hoofed ungulates.

PHYSICAL CHARACTERISTICS AND ADAPTATIONS

- Medium-sized to very large-sized mammals
- Body weight is supported on a single toe or 3 toes together. 3 or 4 digits may be present on the forefoot and 3 on the hind foot. The main axis of the foot passes through the third digit (or single toe). The first digit is always absent.
- Thick skin, sparsely to densely haired.
- Mammae located in the groin area.
- Tail present
- Adaptation for running is especially true for the members of the family Equidae where the development of the foot is a specialization that allows the horse to be a fast and powerful runner. While perissodactyls move forward on their hoofs or digits (digitigrade cursorial locomotion), the soles and heels of their feet never touch the ground.
- Horses and rhinos generally live on grassy plains or open scrub environments, whereas Tapirs are found in humid tropical forests.
- Teeth and lips are structured so that animals can obtain and chew a course herbivorous diet. Depending on how they feed, animals in this order can be classified as either grazers, browsers or both.
- With **hindgut fermentation system,** perissodactyls are able to assimilate relatively indigestible cellulose in their highly fibrous food. This food is digested in the single-chambered stomach and passed to the large intestine and cecum where micro-organisms ferment the ingested cellulose. Unlike Artiodactyls, the perissodactyls do not chew a cud (are not ruminants).

- While the sense organ for smell called **Jacobson's organ** is highly developed in snakes, some mammals (cats, horses, antelope etc) have a less highly developed structure used primarily for tracking. This organ also sometimes referred to as the **vomeronasal organ** (VMO) is located in the palate or nasal cavity and is sensitive to pheromones or scents. The **flehmen response** of males is a particular type of curling of the upper lip, which facilitates the transfer of pheromones and other scents into the VMO organ and is used to determine the sexual status of females.

FAMILY CHARACTERISTICS

Equidae (Horses, Asses and Zebra)

1. Anything that looks like a horse is a horse (donkey, onager etc.)
2. One functional digit on each foot (Toe III tipped by a hoof).
3. Grazers, eat primarily grass, teeth have circular grinding movement
4. The rare Przewalski's horse is the original wild horse ancestor
5. Zebra consist of 3 species and several subspecies
    a. Distributed in Africa only.
    b. Grevy's Zebra is the largest member with the narrowest stripe pattern.
    c. Mountain Zebra of South Africa is the smallest member
    d. Common Zebra includes several subspecies, faint "shadow" stripes can be seen between the black stripes. (Grant's Zebra found at the S F Zoo is one of these subspecies).
    e. Zebras are not suitable for domestication. They are nervous and unpredictable, timid but curious, speedy (40 mph), and one of the favorite foods of lions.

Interrelationship between species

Zebras are not any more closely related to other zebra species than they are to any other horses. There are indications that at one time all horses were striped. In the wild or open country the various species of horse do not associate with one another. However in captivity when there is no opportunity to mate with the same species all species can be crossbred easily. The young are generally sterile because of the different number of chromosomes (from 32 to 66).

Crossbreeds

The hinny, a cross between a stallion and a jenny is used as a beast of burden and a riding animal. A mule is a hybrid offspring of a male ass and a female horse, used as a beast of burden. Both mules and hinnies are generally sterile. The zebroid, a cross between a Grevy's zebra and a horse, is used for riding and as a beast of burden around Mount Kenya, and is said to be better than mules or horses.

Tapiridae (Tapirs)

Primarily vegetarian; long, tapered snout, keen ears and noses; nocturnal habits; squeal that sounds like a whistle; timid.

1. The single genus *Tapirus* consists of 4 species:
    a. **Malayan Tapir** - black and white coloration, only Asian tapir.
    b. **Brazilian Tapir** - found in Central and South America.
    c. **Mountain** (Woolly) **Tapir** - found in South America, endangered.
    d. **Baird's Tapir** - found in Central and South America.
2. Three toes on hind foot and four toes on forefoot (1 vestigial).
3. "Living fossil" with little change in 30 million years.

It is possible that the first tapir ancestors appeared during the Eocene (55 - 38) mya. They are considered by some to be ancestors to all perissodactyls. During the Oligocene (38 - 25) mya they had a wider global distribution. It has only been some 2 million years since North America members of this group migrated into Central & South America. More research needs to be done to fully determine how and when Eurasian members arrived in Malaysia.

Malayan Tapir ~ *T. indicus*
Its striking color pattern allows it to 'disappear' in the dappled sunlight of its tropical forest home
S Burma, Thailand, Malay Peninsula & Sumatra
HBL: up to 8' / SH: 34 - 42" / Wt: 550 - 827 lbs (max 1190 lbs)

Brazilian (South American) **Tapir** ~ *T. terrestris*
Columbia/Venezuela to Paraguay and Brazil
HBL: 6-8 ft / SH: 28-40.5" / WT: 500-600 lbs

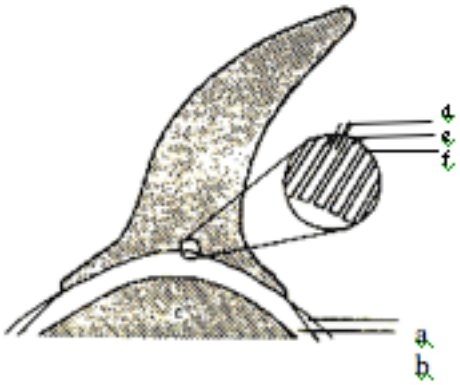
Baird's Tapir ~ *T. bairdi*
Mexico through C America and Columbia, Ecuador west of Andes
HBL:

Mountain (Andean / Woolly) **Tapir** ~ *T. pinchaaque*
Andes Mtns Columbia, Ecuador, Peru and maybe W. Venezuela
Found at elevations of 6,500 - 14,750'
HBL: 71" / WT: 495 lbs.

Young have been referred to as watermelons due to their camouflage spots and stripes during their first year of life.

Rhinocerotidae (Rhinoceroses)

1. Three toes, with stout nails; fleshy pad on sole like camels
2. The rhino horn is dermal in origin, composed of solid keratin fibers and is regenerated by continuous growth. Can either be used as weapons when fighting or for plowing the ground when looking for mineral salts.



Diagrammatic section of a rhinoceros horn: a: epidermis; b: dermis; c: bone; d: dermal papilla; e: matrix of epidermal cells; f: fiber

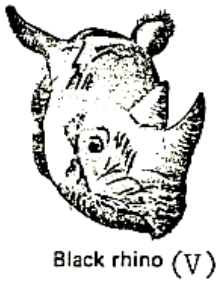
3. All five species are either endangered or threatened. S. F. Zoo rhinos include:
    a. Black Rhino from Africa; hooked, prehensile lip, a browser using lip to strip bushes; rather solitary, not usually seen in groups larger than three; fairly nervous and excitable with poor eyesight.
    b. Greater One-horned Rhino from Nepal, India and Assam, Pakistan. Skin looks like it is made of armor plating and has only one horn. It livers in swamps or wooded meadows near rivers and has excellent smell and poor eyesight.

Thick-skinned and powerful, rhinos once ranged over Asia, Africa, Europe, and North America. Climatic changes initially narrowed its range. More recently hunting, especially for their horns, has been a major factor in their decline. Rhinos are now confined to small areas of Asia and Africa. All five species are now either endangered or vulnerable (IUCN).

AFRICAN

- **White** (Square-lipped) **Rhinoceros** (*Ceratotherium simum*) - two subspecies:
    - **Northern White Rhino** (*C. s. cottoni*) - with less than 500 is the most endangered
    - **Southern White Rhino** (*C. s. simum*) - recovering with more than 3,000 in the wild.
- **Black** (Hook-lipped) **Rhinoceros** (*Diceros bicornus*) - smaller & more dangerous than the white.

White rhino



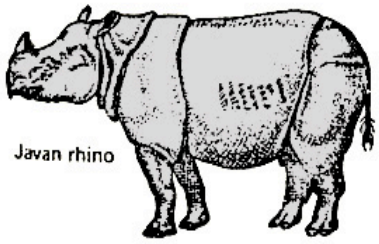
Black rhino (V)

The White rhino is the second-largest land animal. The Dutch word word was corrupted from wide to white. The wide upper lip is adapted for grazing. Its numbers are increasing in South Africa.

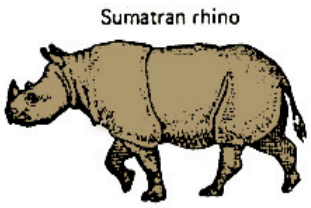
The Black rhino is the most numerous of the rhinos. Found in East and Southern Africa it browses on trees and bushes like its Asian cousins.

ASIAN

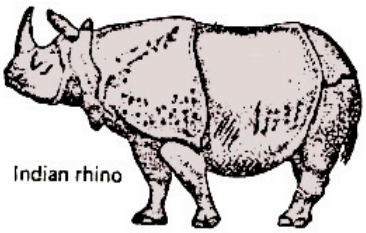
- **Javan Rhinoceros** (*Rhinoceros sondaicus*) - male has small horn while female usually has none.
- **Sumatran Rhinoceros** (*Didermocerus sumatrensis*) - smallest and hairiest of all rhinos
- **Greater One-horned** (Indian) **Rhinoceros** (*Rhinoceros unicornis*) - largest of Asian species.



There are fewer than 100 Javan rhinos, mainly in one Indonesian reserve.



The smallest rhino (4.5 feet tall only numbers a few hundred



Fewer than 600 of this rhino live in the tall grasses of India and Nepal.

STATUS AND CONSERVATION

Except for horses (the only group to be domesticated), perissodactyls are on the decline with several species endangered. Out of twelve generally recognized families, nine have become extinct.

Sources:
Mammals of the World © 1983, by Walker
Encyclopedia of Mammals © 1991 by Grzimek
Encyclopedia of Mammals © 1984 by MacDonald
Rhinos: Endangered Species © by Penny
Wildlife Conservation Magazine, Sept 1992, Tapirs in Trouble by Downer
Animal Kingdom Magazine, Feb/March 1981, the Conspicuous Consumption of Rhinos by Martin
Conservation paper on the rhinoceros, Winter 1992 by Papapeorge
Animal Kingdom Magazine 1989 issues
Wildlife Conservation International, 1990-91 issues

Compiled by Kris Trexler 11/8/1992 Present revisions: 10/2012