

MAMMALS OF THE WORLD

VOLUME II

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Order: PERISSODACTYLA

ODD-TOED, HOOFED MAMMALS—HORSES, TAPIRS, AND RHINOCEROSSES.

CONTAINED IN THE ORDER Perissodactyla are three Recent families: the Equidae (the horses), Tapiridae (the tapirs), and Rhinocerotidae (the rhinos), with a total of 6 Recent genera and approximately 17 species. Members of this order occur in central and southern Asia, Sumatra, Java, Borneo, Africa (except the Sahara), and in the New World from southern Mexico to northern Argentina; tapirs are the only living native perissodactyls of the Western Hemisphere. Tapirs usually inhabit humid tropical forests, whereas horses and rhinos live on grassy plains or in open scrub country.

These are medium to large mammals adapted to running (especially the members of the Equidae). All of the Recent families are quite distinct, with tapirs and rhinos resembling one another more than either family resembles the horse. The main character common to these animals is that the weight of the body is borne on the central digits, with the main axis of the foot passing through the third digit, which is the longest on all four feet. In the horses only the third digit of each foot is functional, whereas in tapirs four digits are developed on the fore foot and three on the hind foot, and in rhinos three digits are present on all four feet. The first digit is not present in Recent forms; it was vestigial in certain fossil species. The terminal digital bones are flattened and triangular, with evenly rounded free edges, and are incased by hooves (some members of the extinct family Chalicotheriidae had clawed digits). Perissodactyls progress on their hoofs or on their digits, never on the sole of the foot with the heel touching the ground. The ulna and the fibula are reduced, so that

the movement of these bones is reduced or lacking. The ankle bone or astragalus has only a single, deeply-grooved, pulley-like surface for the tibia, and its lower end is nearly flat; the calcaneum, or heel bone, which has a widened lower end, does not articulate with the fibula.

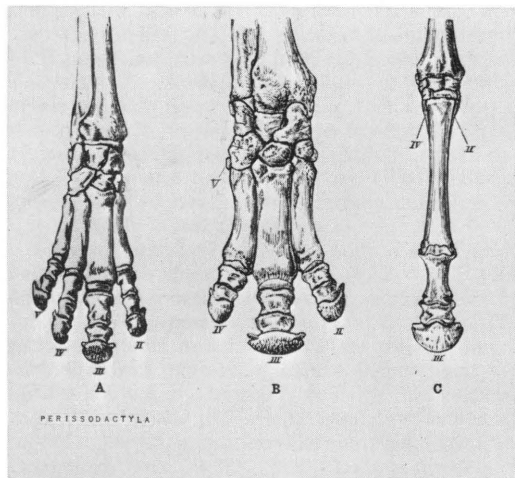
The skin is usually thickened and sparsely to densely haired. The mammae are located in the region of the groin, and the males do not possess a baculum.

The dental formula for the order is as follows: $i\ 0-3/0-3$, $c\ 0-1/0-1$, $pm\ 2-4/2-4$, $m\ 3/3 = 20-44$; for the Recent species it is: $i\ 0-3/0-3$, $c\ 0-1/0-1$, $pm\ 3-4/3-4$, $m\ 3/3 = 24-44$; and in the Eocene genera it is $i\ 3/3$, $c\ 1/1$, $pm\ 4/4$, $m\ 3/3 = 44$. The canines, when present, are never tusk-like in the Recent species. The cheek teeth are arranged in a continuous series; the premolars (at least the rear members of the series) are molar-like in the Recent species; the first cheek tooth is a persistent milk premolar. The grinding teeth are usually complex in structure, massive, and low-crowned to high-crowned; prominent transverse ridges are present in the cheek teeth of tapirs and rhinos, whereas the cheek teeth in horses, which are grazers rather than browsers, develop high crowns with four main columns and various infoldings. Some fossil species in this order had tubercles on the crowns of their grinding teeth. The skull is usually elongate, with an abrupt slope in the back. The nasal bones are expanded posteriorly. Characteristic of the order is the arrangement of openings in the skull by which nerves and blood vessels enter and leave the brain case. The Recent species lack horns with true bony cores, although roughened cushions on the nasal bones of the skull bear horns in rhinos.

The development of the foot is a specialization which, in its highest form, the horses, enables these animals to be swift and strong runners. It is not developed to such an extent in the rhinoceros and tapir. Rhinos, however, can run rapidly for short distances, and tapirs can also run well, although they usually inhabit a type of terrain that permits them to plunge into dense cover or water to escape their enemies. The members of this order eat plants, as they are either browsers or grazers; the structure of their lips and teeth facilitates the obtaining and chewing of coarse vegetable food. Adulthood is attained in four to six years and longevity is five to seven times that long.

Except for horses, which comprise the only group of perissodactyls that was domesticated by man, individual animals of this order are not particularly numerous. Various members of the Equidae, however, are probably second only to the cattle (Bovidae) in the economic life of man.

This order is actually declining in number, it was much more widespread and numerous, with a greater assemblage of forms, in past geologic ages. Nine extinct families are recognized; the geological range of this order is the upper Eocene to the Recent. Four genera, now extinct, are known from the Pleistocene of the Old World.



Bones of the fore feet; A. Tapir (*Tapirus indicus*); B. Rhinoceros (*Rhinoceros sumatrensis*); C. Horse (*Equus caballus*); photos from *Mammalia*, Beddard.

RHINOCEROS; BADAQ RAYA.

THIS FAMILY of four Recent genera, with five living species, inhabits savannahs, shrubby regions, and dense forests in the tropical and subtropical areas of eastern Asia, including Sumatra, Java, Borneo, and Africa. The African rhinos usually live in more open areas than does the Asiatic species. The Recent range of the family is discontinuous. All species are rare or are approaching rarity or extinction.

These hoofed mammals have a massive body, a large head, one or two horns, a short neck, a broad chest, and short, pillar-like legs. The radius and ulna, and the tibia and fibula are only slightly movable, but well developed and separate. The fore foot has three digits (four in some fossil forms) and the hind foot has three digits; the hooves are distinct and separate for each digit. The upper lip is prehensile in two genera (*Rhinoceros* and *Diceros*). The small eyes are located on the side of the head midway between the nostrils and the ears; the ears are fairly short but prominent and erect. The thick skin, which is scantily haired and often wrinkled, is furrowed or pleated, having the appearance of riveted armor plate in some species. The tail bears stiff bristles.

The length of the head and body is 2 to 4.2 meters; the length of the tail is about 610 to 760 mm.; and the height at the shoulders is 1 to 2 meters. The female rhinoceros is smaller than the male. Adults weigh from 1 to 3.5 metric tons. The coloration is grayish to brownish, but the true color is often concealed by a coating of mud or dust.

The dental formula is as follows: i 1-0/1-0, c 0/1-0,

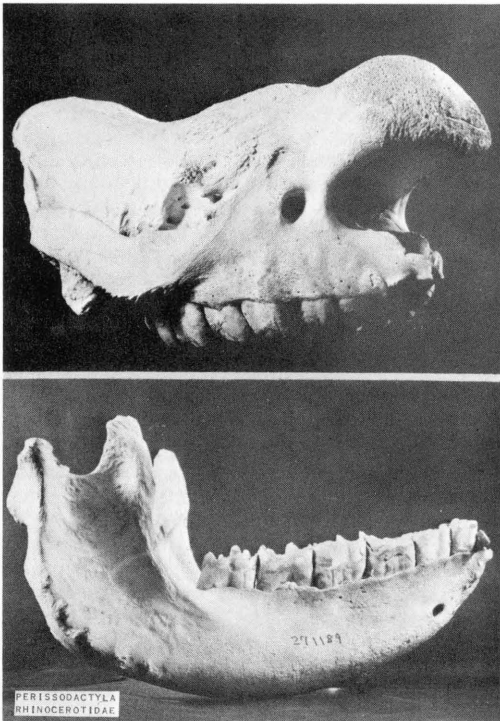
pm 3-4/3-4, m 3/3 = 24 to 34. The incisors and canines are vestigial. The premolars resemble the molars (except the small first premolar). The cheek teeth, which are high-crowned in the square-lipped or white rhino *Ceratotherium* (the only species of Recent rhino which grazes rather than browses) and fairly low-crowned in the other Recent genera, are marked with transverse ridges of enamel. The skull, which is elongate and elevated posteriorly, has a small brain case. The nasal bones project freely beyond the skull. One or two conical median horns are present in Recent rhinos, although short or obscure in some forms (they were not present in some extinct species). If there is only one horn, it is borne on the nasal bones; if there are two horns, the posterior one is over the frontal bones of the skull. These horns are dermal in origin; although solid, they are composed of solid ceratin of a fibrous nature.

Although rhinos in general are solitary except during the breeding season, the square-lipped rhino usually associates in small groups comprised of the adults of both sexes and young animals. These hoofed mammals are active mainly during the evening, through the night, and in the early morning, resting during the day in heavy cover which may be several kilometers from the waterholes. Dense thorn thickets are penetrated by sheer force. Rhinos sleep in both standing and recumbent positions and are fond of wallowing in muddy pools and sandy river beds. They run with a cumbersome motion, reaching their top speed at a canter, that is, at a gait resembling a gallop but with moderate and easy bounds or leaps. The African black rhino (*Diceros*) can attain speeds of up to 45 kilometers per hour for short distances. Rhinos are usually timid but are ferocious at bay. They sometimes charge an enemy, although their attack is often poorly directed. They may grunt or squeal when excited. Vision is poor, but apparently smell and hearing are acute.

These mammals are often accompanied by tick-birds and egrets, which act as sentinels and, in turn, feed on external parasites of the rhinos and on insects stirred up by the feet of these ungulates. The large cats prey on young rhinos, but the adults apparently have no enemies other than man.

Rhinos are generally restricted to areas where daily trips to water are possible. Their paths between the watering and feeding places often pass through tunnels in the brush. These are grazing (*Ceratotherium*) or browsing animals, a variety of vegetation (usually succulents) is included in their diet. Rhinos drop their dung in well-defined piles and often furrow the area around the piles with their horns; these piles may be scattered afterward. They are believed to act as "sign-posts" or "territory markers" (urination spots and rubbing sticks also seem to serve this function).

During the breeding season a pair of rhinos may be together for four months; the members of this family are believed to breed every several years. The gestation period is approximately 510 to 570 days (reported to be seven to eight months in *Didemnocerus*). The single offspring is active soon after birth and remains with its mother until the next youngster is born. The mother may guide its baby with her horn. Rhinos have a life span of almost 50 years.

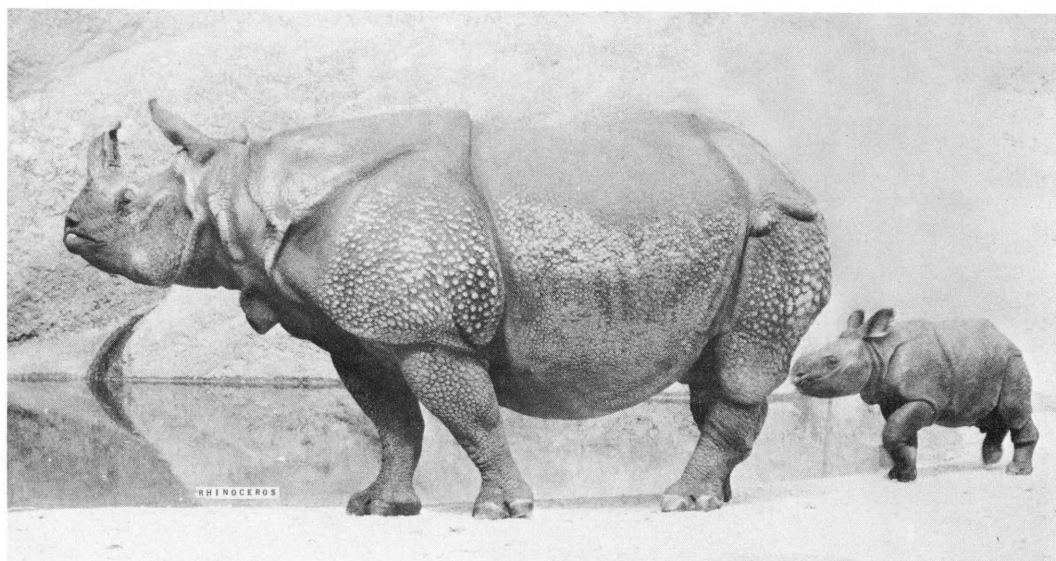


African Black Rhinoceros (*Diceros bicornis*), photos by P. F. Wright of skull in U.S. National Museum.

Man has hunted rhinoceroses extensively because nearly all parts of the animal are used in folk medicine. If they are to be prevented from becoming extinct, it will be necessary to enforce positive and vigorous protective measures.

The geological range of this family is the middle Eocene to the Pleistocene in Europe, the late Eocene to the Recent in Asia, the Miocene to the Recent in Africa, and the late Eocene to Pliocene in North America. The Recent genera are known from at least

the Pleistocene; *Didermocerus* is recorded from the lower Oligocene of Europe and Asia. The only genus of extinct rhinoceros known from the Pleistocene of the Old World is *Elasmotherium*, a huge animal from Siberia. This family was more dominant in earlier geologic epochs than it is at present; at least 30 genera referable to this family are known from past epochs, one of them (*Baluchitherium*) being the largest land mammal yet known.



Great Indian One-horned Rhinoceroses (*Rhinoceros unicornis*), photo by Dorothy Y. Mackenzie.

INDIAN RHINOCEROSSES, ONE-HORNED RHINOCEROSSES; BADAQ RAYA, BADAQ SAMBU (native names).

THIS GENUS comprises two species: *R. unicornis*, a large species native to Nepal and northeastern India; and *R. sondaicus*, which formerly inhabited Sikkim, Bengal, Assam, Burma, Thailand, Indo-China, Malaya and Sumatra but may now be restricted entirely to Java, where no more than four dozen individuals survive. These animals seek tall grass and reed beds in swampy jungle areas.

The length of the head and body is 2.1 to 4.2 meters; the length of the tail is 0.6 to 0.75 meters, the height of the shoulder is 1.1 to 2 meters; and the weight is 2,000 to 4,000 kg. *R. unicornis* is very much larger than *R. sondaicus*. The skin is practically naked except for a fringe of stiff hairs around the ears and the tip of the tail. The skin of *R. unicornis* has large convex tubercles, whereas that of *R. sondaicus* is covered with small polygonal scale-like disks. Coloration is from grayish to blackish with a pinkish cast on the undersurface and the margins of the skin folds. Rhinos are large, awkward-looking creatures with large heads, short, stumpy legs, small eyes, and wide nostrils. Each foot has three toes. Members of this genus have a single "horn" on the upper surface of the nose which is composed of agglutinated hairs and has no firm attachment to the bones of the skull.

These animals may be distinguished from their African relatives by their skin, which has a number of loose folds giving the animals the appearance of wearing armor. The African rhinos lack such folds.

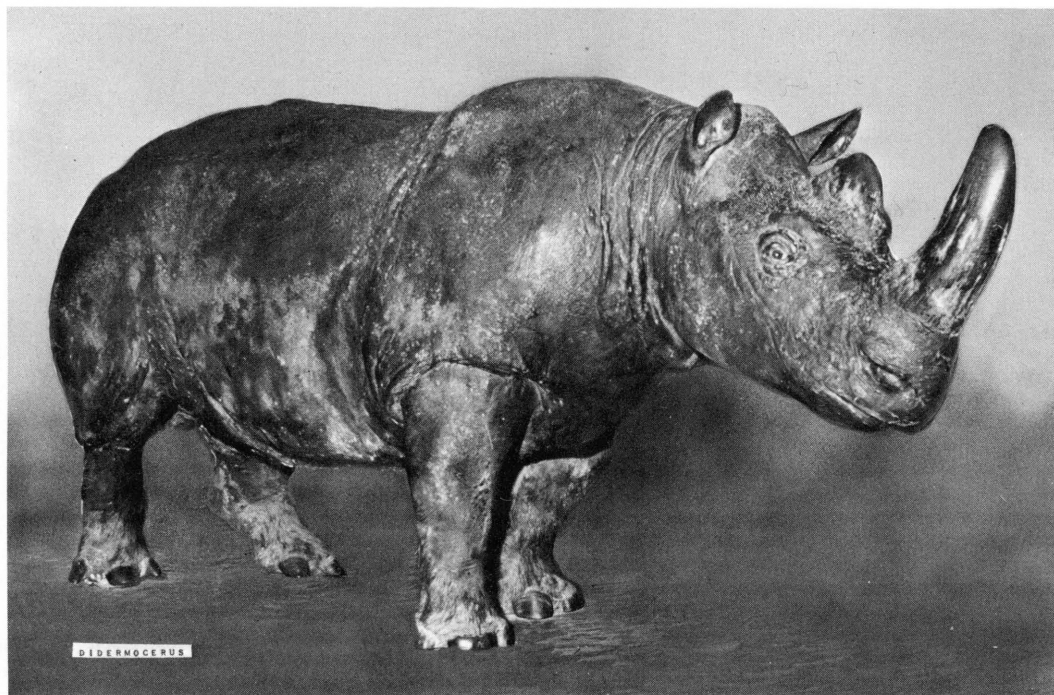
R. unicornis has a fold of skin which does not continue across the back of the neck; in *R. sondaicus*, on the other hand, the fold continues across the mid-line of the back.

These rhinos remain more or less solitary; they usually seek to escape rather than to attack an enemy. When wounded or when with a calf, they occasionally charge. In such defensive charges, contrary to popular belief, they use their sharp, pointed lower tusks—not the "horn." They remain near water, in which they bathe daily; they also enjoy wallowing in mud. Mornings and evenings are the chief feeding periods, the remainder of the day is spent in slumber. Their diet consists of grass, reeds, and twigs.

The birth of a single young takes place between the end of February and the end of April, about 19 months for *R. unicornis* and 17 months for *R. sondaicus* after breeding occurs. The young have a head and body length of 1 to 1.2 meters; a shoulder height of about 0.6 meter; and a weight of 34 to 75 kg. The young nurse for two years. The life span may be as much as 50 years or more.

The Chinese believe that the "horn," blood, and urine of these animals have magical medicinal properties. Because of this, these animals have been ruthlessly killed almost to the point of extinction. For the horn the Chinese pay one-half its weight in gold; they pay about two dollars per kilogram for dried blood. These harmless beasts owe their survival to their elusive and retiring habits and their remote haunts.

The type species of the genus is *R. unicornis*, Linnaeus.



Asiatic Two-horned Rhinoceros (*Didermocerus sumatrensis*), photo of mounted specimen in The City Museum, Bristol, England.

ASIATIC TWO-HORNED RHINOCEROSES; BADAK BĒRĒNDAN, BADAK KERBAU (native names).

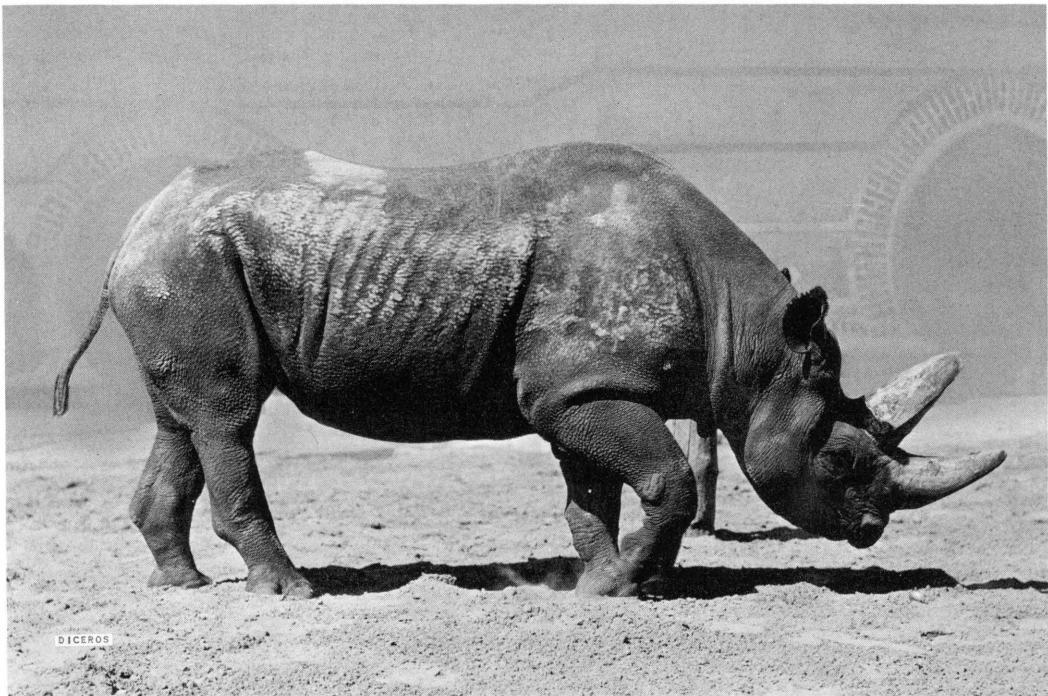
THE SINGLE SPECIES, *D. sumatrensis*, is found in Assam, Burma, Thailand, Indo-China, the Malay States, Sumatra, and Borneo. It formerly came out of the forests into open country but now is a rare animal over its entire range, found mainly in dense hill forests, usually near streams.

This is the smallest living rhinoceros. Head and body length is usually 2.5 to 2.8 meters; shoulder height is usually 1.1 to 1.5 meters; and weight is about 1 metric ton. It is immediately distinguished from the other Asiatic rhinos by its two horns. In the female the anterior horn is about 150 mm. long and the posterior horn is about 50 mm. long. Horn lengths in the male are about three times longer. Coloration is grayish to blackish. The skin is folded, the ears are fringed with hair, and the body hairs are bristle-like.

This animal is usually solitary, but a male and a female may be seen together. As in other rhinos, sight is poor, but the senses of smell and hearing are

good. Mud wallows are frequented, and the day is spent in a wallow or in a sheltered area. This prehensile-lipped browser feeds on leaves, twigs, bamboo shoots, and, occasionally, fruits. It feeds usually in the early morning and evening. One young per birth is the usual number. The gestation period has been reported as seven to eight months.

Extensive hunting by natives and white hunters (particularly with modern firearms and often in violation of the law), indifferent governments, and the slow breeding rate have been the main factors in the numerical decline of this animal. Its extensive hunting has been stimulated by the belief, widespread in the East, that the horn has aphrodisiac properties, and by the use of the horn in carving. There is evidence that there already was extensive trade in rhino horns between Borneo and China more than a thousand years ago. Today this animal is protected over most of its range and may be hunted only with a special license. The danger point may already have been approached, however, and the *Didermocerus* population may be close to extinction.



African Black Rhinoceros (*Diceros bicornis*), photo from the Zoological Garden Berlin-West.

AFRICAN BLACK RHINOCEROSES; SWARTRENOSTER, KIFARU (native names).

THE SINGLE SPECIES, *D. bicornis*, occurs in most parts of eastern and South Africa but is common only locally. Still, it is the most numerous living species of rhino. The western limits apparently are in the region of Lake Chad and eastern Nigeria. Thorn bush country, with scattered streams and water holes, is the typical habitat; but in Kenya rhinos abound in dense mountain forest.

Head and body length is 3 to 3.75 meters; tail length is about 710 mm.; shoulder height is 1.4 to 1.5 meters; and weight is 1 to 1.8 metric tons. The anterior horn is larger than the posterior horn, averaging about 50.8 cm. in length; sometimes the beginning of a third posterior horn is present. Both this rhino and the "white" rhino (*Ceratotherium*) are dark in color, but the black rhino is slightly darker. Coloration in *Diceros* is dark yellowish brown to dark brown. An external feature more clearly distinguishing these two genera is the upper lip; in *Diceros* it protrudes slightly in the middle, and its tip is prehensile, whereas in *Ceratotherium* it is squared.

In contrast to the square-lipped rhino, the black rhino is less sociable and more aggressive. It is sometimes solitary; a female may be accompanied by her single young. Studies indicate that the male will take over and defend a given area. The female and the young also may be present in this area, but strange

rhinos are apparently not tolerated. It is uncertain whether this area represents a breeding station for the male or the usual home range. Dung heaps, urination spots, and rubbing sticks presumably serve as area markers. The rubbing sticks carry the body scent of the animal and also may carry the scent of the secretion of the characteristic sores on the flanks. The black rhino is unpredictable and can be a dangerous animal, sometimes charging a disturbing sound or smell. It has tossed men in the air with the front horn, and regularly charges vehicles and camp fires. Catching the scent of man, it usually crashes off through the brush and runs upwind at speeds of up to 45 km. per hour, sometimes for several kilometers, before stopping.

This is a browsing animal that feeds on twigs and leaves. During the heat of the day it lies in scrub thickets.

Black rhinos seem to breed throughout the year. The gestation period is 530 to 550 days; sexual maturity is attained in about five years.

Somalis value the hide, using it for their shields. The hide also has been used for whip handles. Some natives eat the flesh. The horns have figured in the aphrodisiac trade to China, which seems to be the most important present-day factor leading to the decimation of this species. As in the square-lipped rhino, reserves are deemed essential for the survival of this animal.



Square-lipped or White Rhinoceroses (*Ceratotherium simum*), photo from Societe Royale de Zoologie d'Anvers through Walter Van den Bergh.

SQUARE-LIPPED OR WHITE RHINOCEROSSES; WITRE-NOSTER.

THE SINGLE SPECIES, *C. simum*, is apparently now known in South Africa only from the Zululand reserves, where the present population is estimated at 600 animals and Kruger National Park, into which it has been reintroduced. This species also is found in the southern Sudan, Uganda, and adjacent parts of the Congo. Like the other species of rhinos, this animal has been greatly reduced in numbers, although now through effective protection, it is increasing in South Africa. Habitats are savannahs and brushy areas.

Next to the elephant, this is probably the largest living land mammal. Head and body length is 3.6 to 5 meters; shoulder height is 1.6 to 2 meters; and weight is usually 2.3 to 3.6 metric tons. Coloration is yellowish brown or slaty grayish. This mammal is naked except for the ear fringes and the tail bristles. Hairs are present in the skin but do not protrude. The front horn averages about 0.6 meter in length but can attain a length of more than 1.5 meters.

External features distinguishing the white rhino from the black rhino are as follows: Usually lighter coloration; a squared upper lip with no trace of a

proboscis; elongated and pointed ear conchae with a few bristly hairs at the tips, compared to rounded conchae with hair edges in the black rhino; more sloping, less sharply defined forehead; a shoulder lump; and less conspicuous skin folds on the body.

This rhino is more sociable and less aggressive than the black rhino. Pairs and family units of three and four animals are common, and family groups of six or seven may congregate in a favorable feeding area. The white rhino seems to have a more loosely defined home range and territory than the black rhino. The dung heaps of the white rhino may serve as a sort of "family bulletin board," chronicling the whereabouts of the group, as well as a sort of territorial marker. There are only a few records of attacks on hunters.

White rhinos are mainly grazers, feeding on grasses and low shrubs rather than on the leaves of trees.

They seem to breed throughout the year. The single young is born after a gestation period of 17 to 18 months and is sexually mature at 4 to 5 years of age. A female young gained about 400 kg. in weight (from about 50 to 450 kg.) over an 18-month period and was believed to have eaten its droppings for a short period until it began to eat more solid food.