

Walker's
MAMMALS
of the **WORLD**

4th Edition

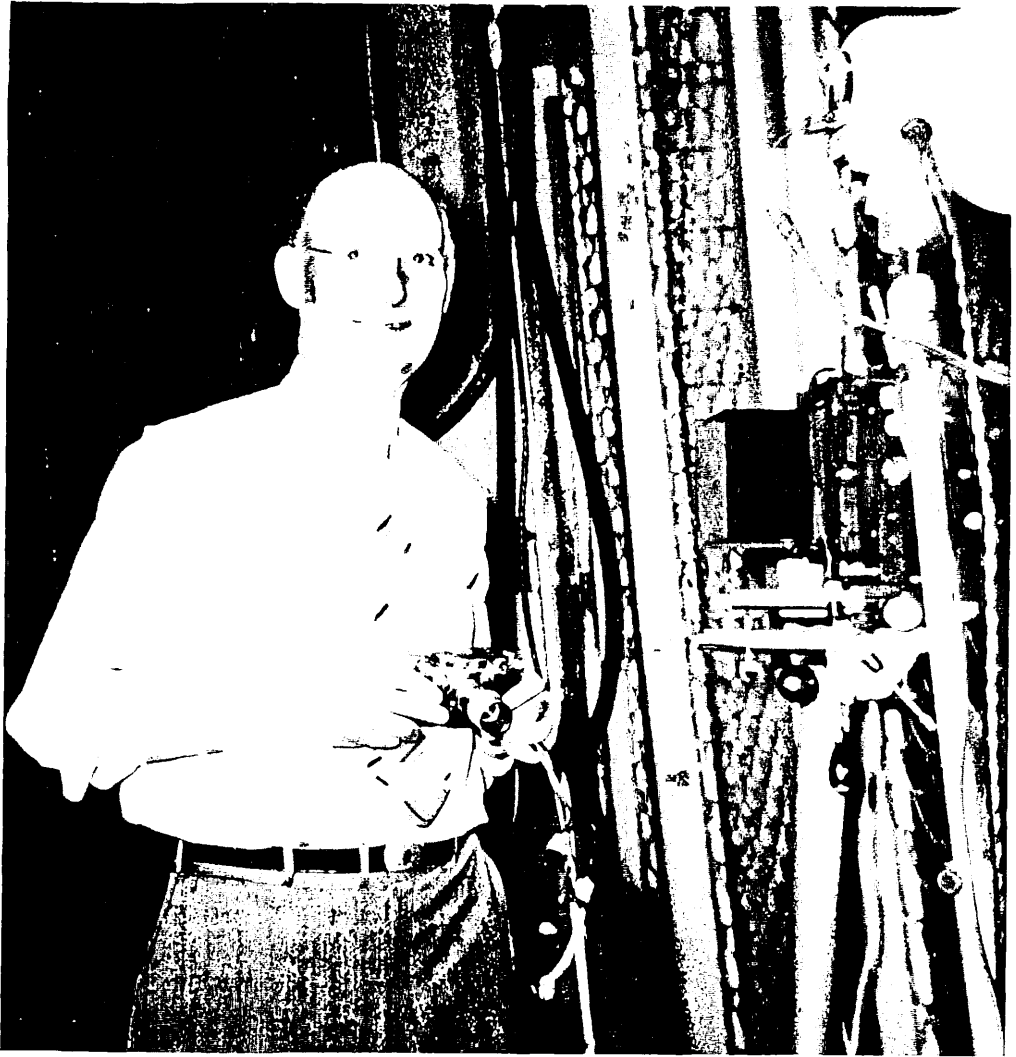
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Ernest P. Walker, 1891-1969

Hemisphere and at various times occupied the land masses between where the present-day Asiatic and South American forms exist. The fact that tapirs are now living in both the American and Asiatic tropics supports the many pieces of evidence that the two continents were connected rather recently as measured by geological time, and that during the period when the two were joined the climate was mild to warm in the northern portion of these continents, making conditions favorable for animals to move from one continent to the other. Subsequently, the continents were separated at the Bering Strait, or any other land bridge that might have existed, and the climate changed so the animals were prevented from moving between the two continents by the strait and by colder climatic conditions.

The geological range of the Tapiridae is early Eocene to Recent in North America, early Oligocene to Pleistocene in Europe, Pleistocene to Recent in South America, and Miocene to Recent in Asia. The geological range of the genus *Tapirus* is late Miocene to Recent. *Megatapirus* is the only extinct tapir that has been found in Pleistocene deposits of the Old World; it is known from Szechwan Province of China. It was much larger than any Recent tapir and had a shorter and deeper skull.

A. Mountain tapir (*Tapirus pinchaque*); B. Brazilian tapir (*T. terrestris*); photos by Bernhard Grzimek.



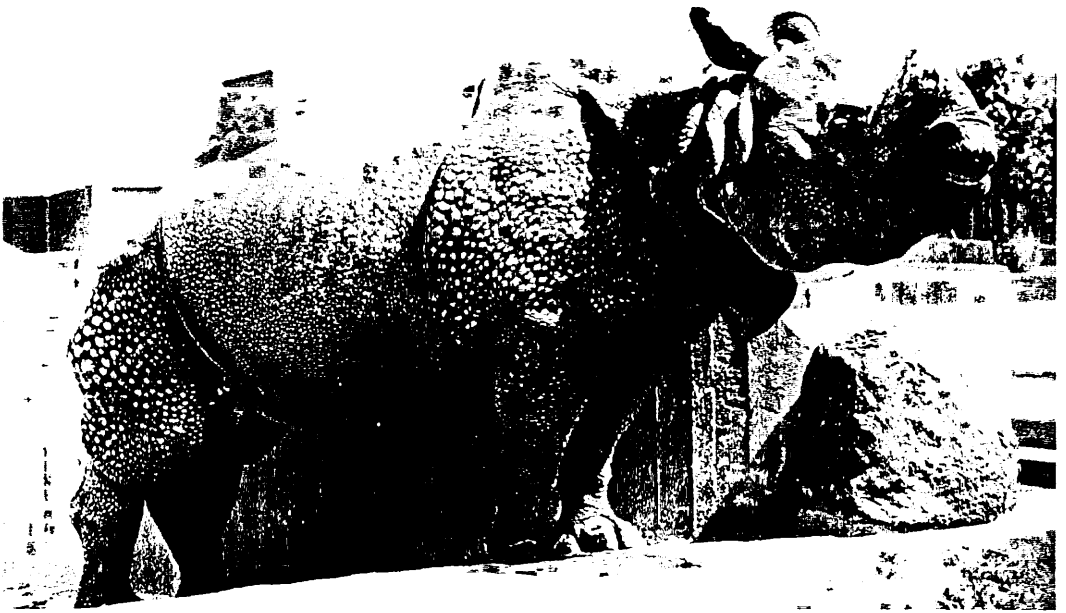
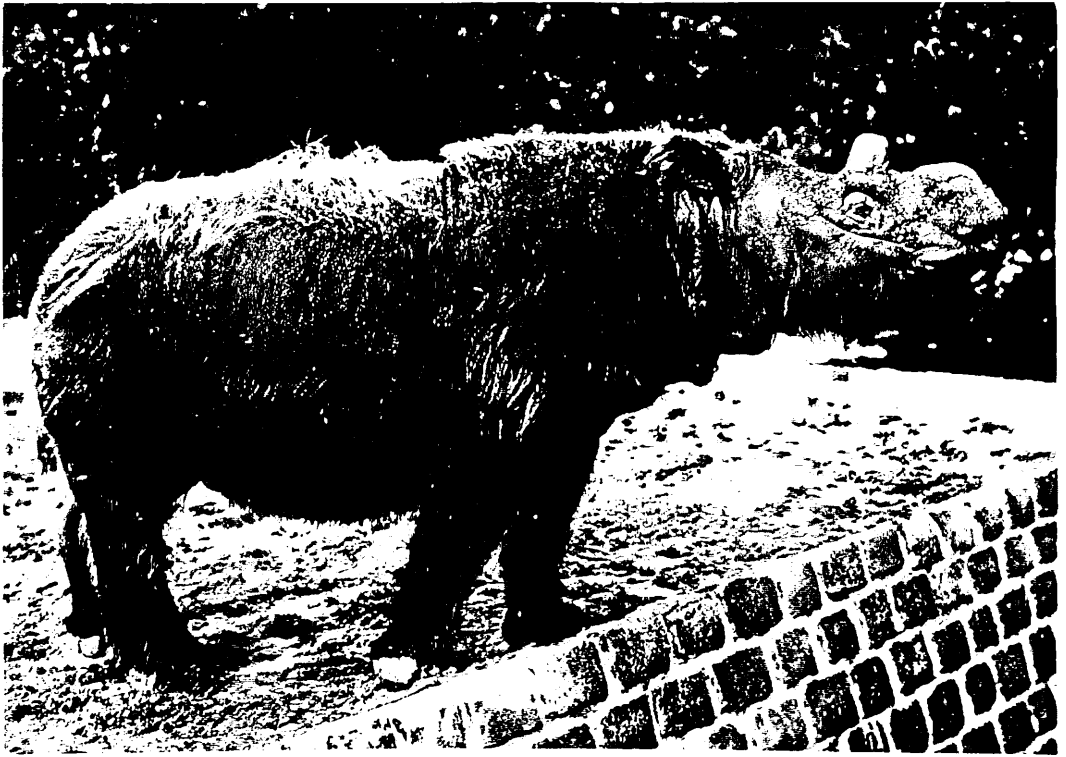
Young Asiatic tapir (*Tapirus indicus*) in a position unusual among perissodactyls, photo by Ernest P. Walker.

PERISSODACTYLA; Family RHINOCEROTIDAE

Rhinoceroses

This family of four Recent genera and five species occurred in historical time in most of Africa south of the Sahara, perhaps in parts of North Africa, and in south-central and southeastern Asia. The sequence of genera presented here follows that suggested by Groves (1967b, 1975b), who recognized two subfamilies: Rhinocerotinae, for *Dicerorhinus* and *Rhinoceros*; and Dicerotinae, for *Diceros* and *Ceratotherium*.

Rhinoceroses have a massive body, a large head, one or two horns, a short neck, a broad chest, and short, stumpy legs. The radius and ulna, and the tibia and fibula, are only slightly movable, but are well developed and separate. The forefoot has three digits (four in some fossil forms), and the hind foot also has three; the hooves are distinct and separate



Sumatran rhinoceros (*Dicerorhinus sumatrensis*), top; Indian rhinoceros (*Rhinoceros unicornis*), bottom; photos by Lothar Schlawe.



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

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 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 200 to 420 cm, the length of the tail is 60 to 75 cm, and the height at the shoulders is 100 to 200 cm. Females are smaller than males. Adults weigh from 1,000 to 3,500 kg. The coloration is grayish to brownish, but the true color is often concealed by a coating of mud.

The dental formula in the family is: (i 0–2/0–1, c 0/0–1, pm 3–4/3–4, m 3/3) × 2 = 24–34. The incisors and canines are vestigial. The premolars resemble the molars (except the small first premolar). The cheek teeth, which are high crowned in *Ceratotherium* (the only species of Recent rhino that 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 braincase. The nasal bones project freely beyond the skull. One or two median conical horns are present in rhinos, although they may be 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 compressed keratin of a fibrous nature.

Rhinos generally inhabit savannahs, shrubby regions, and dense forests in tropical and subtropical regions. The African species usually live in more open areas than do the Asiatic forms. Members of this family are active mainly during the evening, through the night, and in the early morning, resting

during the day in heavy cover that may be several km from the waterholes. They penetrate dense thorn thickets 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. *Diceros* can attain speeds of up to 45 km per hour for short distances. Rhinos are usually timid, but can be 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 smell and hearing are apparently acute.

These mammals are often accompanied by tick birds and egrets, which act as sentinels and feed on external parasites that often infest rhinos. The large cats prey on young rhinos, but the adults apparently have no enemies other than humans.

Rhinos are generally restricted to areas where a daily trip to water is possible. Their paths between the watering and feeding places often pass through tunnels in the brush. These animals eat a variety of vegetation, but succulent plants comprise the bulk. 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 purpose).

During the breeding season, a pair of rhinos may be together for 4 months; females may give birth every 2 years. The gestation period is about 420 to 570 days. The single offspring is active soon after birth, and remains with the mother until the next youngster is born. The mother sometimes guides the baby with her horn. Rhinos have a potential lifespan of almost 50 years.

Humans have hunted rhinoceroses extensively because nearly all parts of the animal are used in folk medicine. Nearly all species of the family are threatened at the present time; some are verging on extinction.

The geological range of this family is middle Eocene to Pleistocene in Europe, late Eocene to Recent in Asia, Miocene to Recent in Africa, and late Eocene to Pliocene in North America. The living genera are known from at least the Pleistocene; *Dicerorhinus* 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 geological epochs than it is at present. At least 30 genera referable to this family are known from past epochs, 1 of them (*Baluchitherium*) being the largest land mammal yet known.

PERISSODACTYLA; RHINOCEROTIDAE; Genus
DICERORHINUS Gloger, 1841

Sumatran Rhinoceros, Hairy Rhinoceros

The single species, *D. sumatrensis*, originally occurred from Assam and southeastern Bangladesh to the Malay Peninsula and possibly Viet Nam, and on Sumatra and Borneo (Groves and Kurt 1972; Lekagul and McNeely 1977; Rookmaaker 1977, 1980; Van Strien 1975).

This is a short-bodied, two-horned rhinoceros, with the frontal horn often so inconspicuous that it appears to be single horned. The nasal (posterior) horn is generally short, the record length being 381 mm. Head and body length is 235 to 320 cm, shoulder height is 110 to 150 cm, and estimated weight is 1,000 to 2,000 kg. The facial skin is characteristically wrinkled around the eye, but the muzzle is rounded and unwrinkled due to heavy keratinization. The skin on



Sumatran rhinoceros (*Dicerorhinus sumatrensis*), photo by Erna Mohr.

the body of this animal is folded, as in *Rhinoceros*, so it has the appearance of being armor plated. The ears are fringed with hair, and the body hair is plentiful, coarse, and bristlelike. Coloration is brown or dark gray.

According to Groves and Kurt (1972), the habitat of the Sumatran rhinoceros is mainly hilly country, near water; it needs high humidity for survival. This animal seems to be attracted to secondary growth, where it feeds sometimes on cultivated plants. It inhabits both tropical rain forest and mountain moss forest where it can climb steep slopes with agility. *Dicerorhinus* swims well, and has even been known to swim in the sea. Van Strien (1975) concluded that *D. sumatrensis* is an animal that can live in a wide variety of habitats, from swamps at sea level to high in the mountains. Older literature, however, indicated that the hill tracts were probably the preferred habitat of the species.

According to Groves and Kurt (1972), the Sumatran rhino engages in seasonal movements, keeping to hilly country when the lowlands are flooded during the rains and descending when the weather has become cool near the end of the rains. In March, the rhino returns to the high ground, possibly to escape the hordes of horse flies that abound at lower levels during the dry season.

Dicerorhinus feeds on fruit, leaves, twigs, and bark; wild mangoes, bamboos, and figs are especially favored. All species of plants found in second growth are eaten; the rhino uses its horn to break down small trees. *Dicerorhinus* is fond of salt, and the genus is known to visit salt licks. Feeding is generally before dawn and after sunset, mostly at night. Much of the day is spent in wallows.

Male Sumatran rhinos seem to be more nomadic than females. Females apparently live in territories, the diameters of which may be some 500 to 700 meters. Each territory is surrounded by feeding grounds, which are visited by several different animals. Within the territory is a dense system of tracks leading to and from a wallow, which is usually located on a mountaintop or a catchment area of a small stream.

Home range for the female is 2 to 3.5 km in diameter. Both sexes usually wander about singly (Van Strien 1975).

Van Strien (1975) wrote that reproductive data are incomplete, but that all authorities agree that *Dicerorhinus* is a slow breeder and has only one calf at a time. The gestation period has often been said to be 8 months, but Groves and Kurt (1972) thought this unlikely, considering the 15- to 18-month gestation period of other rhinos. A newborn young weighed about 23 kg and measured 914 mm in length. The horn of this baby was 20 mm in height, the coloration of the body was nearly black, and the hair over the whole body was short, crisp, and black. A captive specimen lived for 32 years and 8 months (Marvin L. Jones, Zoological Society of San Diego, pers. comm.).

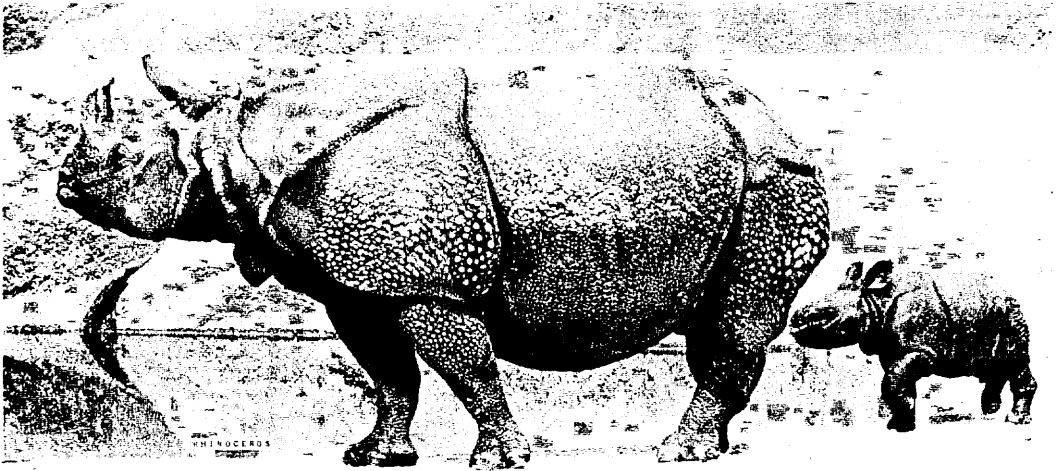
The Sumatran rhino is considered endangered by the IUCN (1976) and the USDI (1980), and is on appendix 1 of the CITES. It has been exterminated in much of its original range, and the world population is probably in the low hundreds. The principal cause of the decline has been overhunting for supposed aphrodisiac and medicinal products that are made from its horn and other parts of the carcass by some peoples of the Orient.

PERISSODACTYLA; RHINOCEROTIDAE; *Genus*
RHINOCEROS Linnaeus, 1758

Asian One-horned Rhinoceroses

There are two species (Ellerman and Morrison-Scott 1966; Rookmaaker 1980; IUCN 1976, 1978):

- R. unicornis* (Greater Indian rhinoceros), originally found in northern Pakistan, much of northern India, Nepal, and Assam;
- R. sondaicus* (Javan rhinoceros), originally found from



Greater Indian rhinoceroses (*Rhinoceros unicornis*), photo by Dorothy Y. Mackenzie.

Sikkim and eastern India to Viet Nam and possibly southern China, and on the Malay Peninsula, Sumatra, and Java.

Head and body length is 210 to 420 cm, tail length is 60 to 75 cm, shoulder height is 110 to 200 cm, and 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, scalelike disks. Coloration is gray to black, with a pinkish cast on the under-surfaces and on the margins of the skin folds. These rhinos are large, awkward-looking creatures, with large heads, short, tubular legs, small eyes, and wide nostrils. Members of this genus have a single horn on the nose, which is composed of agglutinated hairs and has no firm attachment to the bones of the skull.

These rhinos may be distinguished from their African relatives by their skin, which has a number of loose folds, giving the animal the appearance of wearing armor. The African rhinos lack such folds. *R. unicornis* has a fold of skin that does not continue across the back of the neck; *R. sondaicus*, on the other hand, has a fold that continues across the midline of the back.

These rhinos live in tall grass and reed beds in swampy jungles. They remain more or less solitary throughout their lives. They usually seek to escape rather than attack an enemy. When wounded or when a calf is threatened, they may 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, and 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 16 months after mating occurs. The young have a head and body length of 100 to 120 cm, shoulder height of 60 cm, and weight of 34 to 75 kg. The young nurse for 2 years. The life span may be 50 years or more.

Both species have been greatly reduced in numbers and distribution, mainly through habitat loss and ruthless hunting for their horns, which many persons believe to have medici-

nal properties. *R. unicornis* is now restricted to a few places in Nepal and eastern India, and numbers about 1,000 individuals. *R. sondaicus*, among the world's most critically endangered species, may now survive only in the Ujung Kulon Reserve in western Java, where about 50 individuals are present. There also, however, have been reports of the species in southern Laos and Tenasserim (Lekagul and McNeely 1977; Rookmaaker 1980). Both species are classified as endangered by the IUCN (1976, 1978) and the USDI (1980), and are on appendix 1 of the CITES.

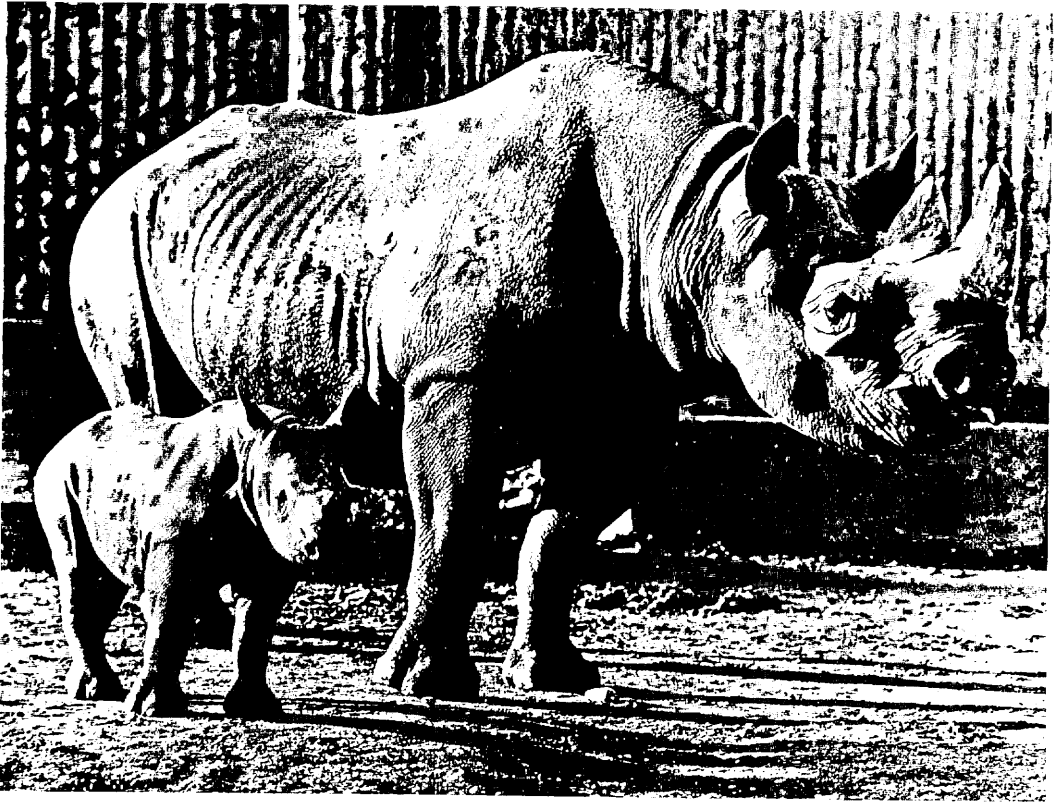
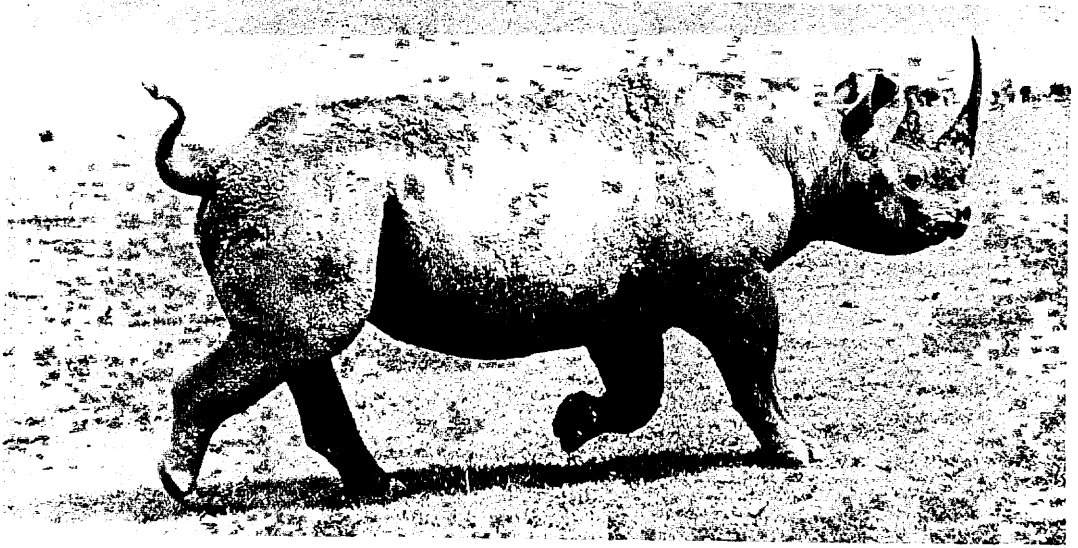
PERISSODACTYLA; RHINOCEROTIDAE; *Genus DICEROS*
Gray, 1821

Black Rhinoceros

The single species, *D. bicornis*, originally occurred throughout eastern and southern Africa, and in the north ranged as far as northeastern Sudan and at least as far west as northeastern Nigeria (Meester and Setzer 1971).

Head and body length is 300 to 375 cm, tail length is about 70 cm, shoulder height is 140 to 150 cm, and weight is 1,000 to 1,800 kg. The anterior horn is larger than the posterior one, averaging about 50 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 somewhat darker. Its coloration is dark yellow brown to dark brown. An external feature more clearly distinguishing these genera is the upper lip: in *Diceros* it protrudes slightly in the middle and its tip is prehensile, whereas in *Ceratotherium* it is squared and nonprehensile.

Diceros inhabits the transitional zone between grassland and forest, generally in thick thorn bush or acacia scrub but also in more open country (Schenkel and Schenkel-Hulliger 1969). Joubert and Eloff (1971) reported that, in Etosha National Park in Namibia, the most important factor influencing black rhino distribution is the presence of many natural, permanent water holes. *Diceros* is a browser and lives on a variety of bushes and shrubs. Joubert and Eloff (1971) stated that in Etosha National Park, the rhino browses on many different kinds of plants, yet seems to prefer only a few genera, particularly *Acacia*, which forms the bulk of the diet.



Black rhinoceroses (*Diceros bicornis*): Top, photo by Bernhard Grzimek; Bottom, photo from Zoological Society of London.

The black rhino is less gregarious than the white rhino. Schenkel and Schenkel-Hulliger (1969) found that in Tsavo National Park East, in Kenya, *Diceros* is not territorial. Joubert and Eloff (1971) also found that this animal is not territorial in Etosha National Park. The only stable bond among black rhinos seems to be that between mother and

calf, which lasts even past the next birth (but probably breaks soon afterward). Intolerance between bulls does occur, but it is not a predominant feature of the social system. Bulls in Tsavo were observed to form temporary groups, moving and feeding together, but these associations were shortlived. Breeding apparently occurs throughout the year. A pre-

mating bond develops between the bull and the cow, and the pair remain together during resting and feeding; they even sleep in contact with each other. Jarvis (1967) tabulated data from six zoos, which indicate that the first successful mating for a female *Diceros* is in its sixth year. The estrous cycle is 17 to 60 days, and the gestation period is from 419 to 476 days. According to Grzimek (1975), there is a single calf, which weighs about 20 kg at birth, nurses for about 2 years, and usually remains with the mother for 3½ years. One black rhino was still living after 45 years in captivity (Marvin L. Jones, Zoological Society of San Diego, pers. comm.).

The black rhino is unpredictable and can be a dangerous animal, sometimes charging a disturbing sound or smell. It has tossed people in the air with the front horn, and regularly charges vehicles and campfires. Catching the scent of humans, 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. Apparently the sense of smell is the primary method of detecting danger. Schenkel and Schenkel-Hulliger (1969) found that human scent alone causes great alarm among black rhinos. On the other hand, if they detect no scent, rhinos will show no interest in a motionless person or car unless it is closer than 20 to 30 meters.

The black rhino has been greatly reduced in numbers and distribution in recent years, because of excessive hunting and habitat disruption. Probably fewer than 30,000 animals survive in all of Africa. The price of rhino horn (used as an aphrodisiac in the Orient and made into dagger handles in the Middle East) has escalated dramatically and poaching of the rhino has been widespread and very destructive. *Diceros* is classified as vulnerable by the IUCN (1978) and is listed as endangered by the USDI (1980). It is on appendix 1 of the CITES.

PERISSODACTYLA; RHINOCEROTIDAE; *Genus*
CERATOTHERIUM Gray, 1868

White or Square-lipped Rhinoceros

In the 19th century the single species, *C. simum*, inhabited two widely separated regions of Africa (Groves 1972b; Meester and Setzer 1971). The subspecies *C. s. cottoni* occurred in southern Chad, the Central African Republic, southwestern Sudan, northeastern Zaire, and northwestern Uganda. The subspecies *C. s. simum* occurred in southeastern Angola, possibly southwestern Zambia, central and southern Mozambique, Rhodesia, Botswana, eastern Namibia, and northern and eastern South Africa. About 2,000 years ago, the range of *Ceratotherium* extended up the Nile Valley into southern Egypt, and probably covered much of northwestern Africa.

Except for *Elephas*, *Loxodonta*, and perhaps *Hippopotamus*, *Ceratotherium* is the largest living genus of land mammal. Head and body length is 360 to 500 cm, shoulder height is 160 to 200 cm, and weight is usually 2,300 to 3,600 kg. Coloration is yellowish brown to slaty gray. This mammal is naked except for the ear fringes and tail bristles. Hairs are present in the skin, but do not protrude. The front horn averages about 60 cm in length but can reach more than 150 cm.

External features distinguishing *Ceratotherium* from *Diceros* are as follows: usually a 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 hairy edges in the black rhino; a more sloping, less sharply defined forehead; a shoulder hump; and less conspicuous skin folds on the body.

In South Africa, *Ceratotherium* inhabits primarily the bushveldt zones; in the Nile region, it lives in open *Combretum* forest and the nearby plains. Steeply undulating country is traversed but not permanently inhabited. In Uganda, the white rhino enters swampy country in the dry season; when the rains come, it moves 10 or more km inland from the Nile, especially to an area known as the Bibba Ridge. It is active in the morning and in the evening; other hours are spent wallowing or resting. On warm, windless days, however, animals may be actively feeding at all hours. During rest periods, they lie in the shade of a tree or a termite hill. *Ceratotherium* differs from other rhinos in that it is entirely a grazer. It feeds largely on such grasses as *Pennisetum*, *Panicum*, *Urochloa*, and *Digitaria* (Groves 1972b; Owen-Smith 1975).

In Zululand, South Africa, Owen-Smith (1974) found that cohesive social groups of *C. simum* included cow-calf pairs, adolescent groups, cow-cow groups, and adult male singletons; the largest group numbered six animals. Adult males occupy territories of about 2 sq km in size for several years. Olfactory marking is carried out by dung scattering and urine spraying. Cows have overlapping basic home ranges covering some 10 to 12 sq km, but at times they may wander farther afield. Groves (1972b) wrote that the bull is more vocal than the cow, making noises that include snorts, belows, and loud cries like an elephant's trumpet.

The following data on reproduction were taken from Groves (1972b) and Owen-Smith (1974). Mating is year-round, but is most common from July to September in Zululand and from February to May in Uganda. Males fight fiercely and bloodily for the females, charging each other head on; death often may occur as a result of these encounters. Several males follow a female in estrus, and one finally succeeds in driving away the others, and mates with the female. In Zululand, estrous females form consort pairs with territorial bulls which may last for 2 to 3 weeks. The gestation period is estimated to be between 480 and 550 days. The newborn calf weighs about 50 kg and remains shaky for 2 to 3 days. When alarmed, it runs ahead of the cow. Weaning commences at 2 months of age, but nursing may continue until well over 1 year. The older calf is driven off at the birth of a new calf. Females have their first calf at age 6½ to 7 years, but a male is probably over 12 years of age before he can claim a territory and mate. A wild, 36-year-old female was still reproductively active.

The northern subspecies of the white rhino (*C. s. cottoni*) has been greatly reduced in numbers through indiscriminate hunting for the horns, which are considered by some peoples of the Orient to have aphrodisiac properties. The IUCN (1978) reported that the total number of animals for this subspecies may be less than 500, and certainly less than 1,000. The southern population (*C. s. simum*), however, has made a remarkable comeback from near extinction in recent years. It was greatly overexploited in the 19th century, but since the turn of the century has been carefully protected on reserves. The animals on these reserves multiplied to the point where management problems were evident in some areas. Surplus animals were removed from these overpopulated areas and used in reintroduction programs elsewhere. Today, this southern population is considered safe, and represents a major conservation success story. *C. s. cottoni* is classified as endangered by the IUCN (1978) and the USDI (1980), and is on appendix 1 of the CITES. *C. s. simum* is on appendix 2 of the CITES.



White or square-lipped rhinoceroses (*Ceratotherium simum*): Top, photo from Société Royale de Zoologie d'Anvers through Walter Van den Bergh; Bottom, photo by K. Rudloff through East Berlin Zoo.