

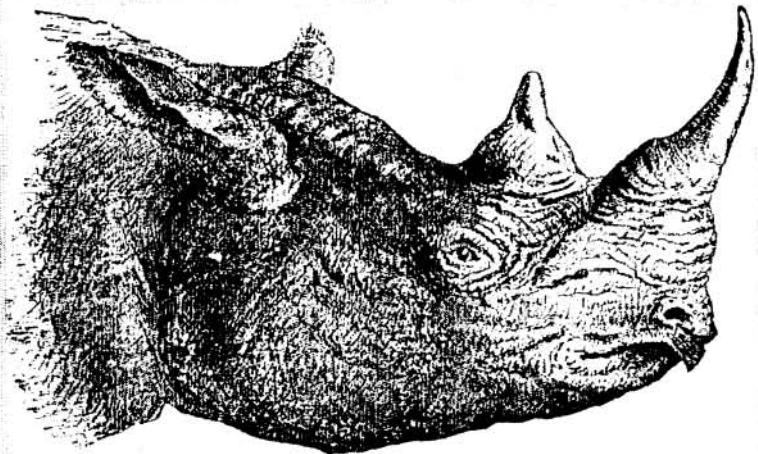
AFRICAN RHINOCEROSSES

Although it is commonly reported by hunters, who in many cases derive their information from native sources, that there are several kinds of rhinoceroses inhabiting Africa, we have at present definite acquaintance with only two species, namely, the common African rhinoceros, frequently spoken of as the black rhinoceros, and the square-mouthed, or Burchell's rhinoceros, commonly termed the white rhinoceros. Since there is but little, if any, marked difference in the color of the two animals, the names founded on this characteristic are best discarded. It is possible, however, that a third species may inhabit East Africa.

Characteristics Both species are furnished with two horns, which attain a greater development than in either of their Asiatic relatives. From all the latter the African rhinoceroses are distinguished by the absence of any permanent folds in the skin, and also by the want of both incisor teeth and tusks in the adult state, such teeth if they occur even in the young being rudimentary and functionless. In consequence of this want of front teeth, the extremities of both the upper and lower jaws are much shorter than in the Asiatic species. Moreover, whereas in the latter the nasal bones are narrow and terminate in a point, in the African rhinoceroses they are rounded and truncated in front. In both kinds the skin of the body is almost entirely naked and comparatively smooth; but there is generally a little fringe or tuft of hair on the ears and tail.

Common African Rhinoceros The common African rhinoceros (*R. bicornis*) is the smaller of the two species, and is also the one which has by far the wider distribution, extending, in suitable districts, through Eastern and Central Africa, from Abyssinia in the north to the Cape Colony in the south.

From the character of the upper lip this species is sometimes spoken of as the prehensile-lipped rhinoceros, while in Southern and Eastern Africa it is variously termed the boreli or upetyani, the keitloa, and the kulumani; these different native names, as we shall notice later, referring to differences in the relative proportions of the two horns. This species is best characterized by the pointed and slightly prehensile upper lip, the small and rounded nostrils, and the position of the eyes being a little behind the continuation of the axis of the second horn. The ears are of moderate length, and



HEAD OF THE COMMON AFRICAN RHINOCEROS.

furnished with a fringe of hair along the upper edge, while in some cases they are rounded above, although in others more pointed. There is a considerable amount of individual variation as to the length and amount of the fringe of hair on the margins of the ears. The molar teeth of this rhinoceros are of the type of the uppermost of the two represented on p. 1051; that is to say, they have comparatively low crowns, a well-marked buttress at their front outer angle, the middle valley not divided into two moieties by a cross partition, and the surface of the crown when worn raised into two distinct ridges. The latter feature shows that the jaws have a somewhat champing, instead of a completely grinding action; and since we know that this species feeds almost exclusively on twigs and leaves, it may be assumed that molar teeth of this pattern always indicate a similar diet for their owners. The horns are well developed in both sexes.

As regards dimensions, in an adult female from Abyssinia described by Mr. Blanford, the length from the tip of the snout to the end of the tail measured along the curves was six feet nine inches, of which one foot nine and one-half inches was occupied by the tail, and the height at the shoulder four feet eight and one-half inches. These dimensions are, however, exceeded by males, which, according to Sir S. Baker, may stand from five feet six inches to five feet eight inches at the shoulder.

The proportions of the two horns to one another vary greatly, the front one being in some cases much longer than the hinder, while in others the two are nearly or quite equal, and, more rarely, the second horn may be the longer of the two. The native name *boreli* is applied to those individuals in which the second horn is the shorter, while *keitloa* is restricted to such as have horns of equal length, or the second longer than the first. Mr. Selous has shown that there is a complete transition from the one to the other type, and consequently that such differences cannot have any specific value.

Size of Horns In regard to the length attained by the horns of this species, it appears that in Abyssinia and other parts of Northeast Africa, from Sir S. Baker's experience, the front horn rarely or never exceeds twenty-three or twenty-four inches, but much larger dimensions are recorded in South and East-African specimens. Thus examples of the front horn are described as measuring 44, 43, 41, 40 and $38\frac{1}{2}$ inches in length; but with the exception of the last, in which its length is 21 inches, in none of these examples are the dimensions of the second horn recorded. In one specimen the length of the first and second horns were respectively 31 and $19\frac{1}{2}$ inches, in another $28\frac{3}{4}$ and $15\frac{1}{4}$, in a third $28\frac{1}{4}$ and $8\frac{3}{8}$, in a fourth 27 and $16\frac{1}{2}$, in a fifth $21\frac{1}{2}$ and $18\frac{3}{4}$, and in a sixth $14\frac{5}{8}$ and $14\frac{3}{4}$ inches. The front horn is generally nearly circular in section and slightly curved backward, while the second is nearly straight, much compressed, and with its hinder edge often sharper than the front one. Sir J. Willoughby killed in East Africa an example of this rhinoceros having a small rudimental third horn behind the normal pair.

Habits In Abyssinia Mr. Blanford states that this rhinoceros is confined to the lower elevations, not ascending above some five thousand feet. In the valley of the Anseba he writes that "it inhabits the dense thickets on the banks of the stream, which are intersected in all directions by the paths made by these

animals. In the densest parts, where roots and stems render the jungle almost impervious, there are places known by the inhabitants as rhinoceros houses. The stems and branches have generally been broken away or pushed back, so as to leave a clear space, about fifteen or twenty feet in diameter, at the bottom of which the ground has been worn into a hollow by the trampling and rolling of the animal in wet weather. These houses are used as retreats during the heat of the day. On two or three occasions we disturbed a rhinoceros from one of these, and he rushed off with much noise and loud snorts through the bushes. So far as we could learn from our observations, these animals enter the thick jungle early in the morning and rest until one or two o'clock in the day, then they leave their thickets and go out to feed, usually remaining, however, among high bushes. At the time of year in which we visited the country, rain generally set in in the afternoon, and, even if it did not rain the sky was overcast. In the clear weather the rhinoceroses are said never to appear before evening. They are great browsers, feeding chiefly on the young shoots and branches of acacia and other trees, or on fruits; so far as I could see they do not generally eat grass. Their movements are very quick, their usual pace being a smart trot, and the numerous tracks show that they move about a good deal." After expressing his doubts as to the statements of the natives that a man on horse cannot escape from one of these animals, Mr. Blanford adds that "they are easily eluded by turning, as they are not quick of sight, and, like most Mammals, they never look for enemies in trees; consequently, a man two or three feet from the ground will remain unnoticed by them if he keeps quiet. They are said to be extremely savage, and unquestionably the first one killed by us charged most viciously. . . . I cannot help thinking, however, that their savage disposition has been somewhat exaggerated." Most of these animals seen by the members of the Abyssinian Expedition were in pairs,—an old female with a nearly full-grown calf,—but on one occasion four were observed. Mr. Blanford compares the snort of alarm or rage uttered by these animals when disturbed to the noise of a locomotive rather than to the sound of any other animal.

The foregoing account is confirmed in all essential particulars by the observations of Mr. Selous in Southeastern Africa, who writes that this species of rhinoceros "lives exclusively upon bush and roots, eating not only the young leaves as they sprout from the end of a twig, but also chewing up a good deal of the twig itself. It is owing to the fact that this species lives upon bush that its range is very much more extended than that of the square-mouthed rhinoceros; for there are many large districts of the country in the neighborhood of the Zambezi to the eastward of the Victoria Falls covered almost entirely with an endless succession of rugged hills, almost devoid of grass, though well wooded, in all of which districts the prehensile-lipped rhinoceros is numerous, as it thrives well upon the scrubby bush with which the hillsides and valleys are covered; whereas the square-mouthed species, though common in the forest-clad sand belts and broad grassy valleys which always skirt the hills, is seldom or never found among the hills themselves, which is doubtless because the pasturage is too scanty to enable it to exist."

The same writer also tells us that this rhinoceros, like the larger African species, exhibits extraordinary activity in getting over hilly and rocky ground, and that it

can traverse places which at first sight appear utterly impracticable for an animal of its bulky and apparently clumsy build. We also learn from the same observer that while the present species of rhinoceros always walks with its nose carried high in the air, the other kind walks with its muzzle close to the ground. Again, whereas in the common species the calf invariably follows its mother, the offspring of Burchell's rhinoceros as constantly precedes its parent.

Mr. Selous agrees with Mr. Blanford that the ferocity of the prehensile-lipped rhinoceros has been much exaggerated, and he is, indeed, inclined to regard it as an animal of a rather cowardly, if not exactly peaceable, disposition. It must, however, be borne in mind that those sportsmen who have attributed a ferocious disposition to this species, always make a distinction in this respect between the boreli and the keitloa, and give to the latter a much better character than they assign to the former. Whether any difference in this respect is really associated with the variations to which these names refer, we are not prepared to say (although it seems most unlikely); but it is important to notice that even those who attribute extreme ferocity of disposition to some individuals of this species have never asserted that this applies to all. Mr. Selous states that he was only once charged by a common rhinoceros, and this after strong provocation and even then the animal did not charge home; and he considers that vicious individuals are comparatively few and far between. "These animals," writes the same observer, "are very quick and restless in their movements, and either very inquisitive or mistrustful of their eyesight, for usually, when disturbed by anyone approaching from below the wind, they will jump up with a snort, gaze fixedly at the intruder, then, with another snort, trot quickly a few steps nearer, stand again, move their heads with a quick motion, first to one side then to the other, advance again perhaps, and finally, when shouted at, whisk quickly round and trot away in grand style, with tail screwed up over their backs." Recounting his experiences in Mashonaland, where he sometimes met with five, six, or even eight in a day, Mr. Selous says that whenever these animals met his wind, they invariably made off at once, but when they only saw him, they acted in the manner above described. On occasions of the latter kind the Kaffirs would take refuge up the nearest tree, and would urge their master to do likewise. He, however, always stood his ground, and found that although the rhinoceroses would sometimes advance in his direction from about forty to twenty yards' distance, yet, that if he threw stones or assagais at them, or even simply shouted, they always eventually turned tail and fled. If, however, a rhinoceros is fired upon when thus facing a man, it will, after dropping upon its knees, very often spring up and rush straight forward; but Mr. Selous attributes such action not to any intention of making a charge, but merely to the animal being maddened by the shock and rushing blindly ahead; and he considers that it is thus that many of the accounts of its fierceness and aggressiveness have originated. He adds, however, that one of these animals when in full career, and either wounded or tired, will not hesitate to charge any obstacle that may be in its path, even a wagon and a team of oxen. Finally, Mr. Selous states that he believes the pursuit of the common African rhinoceros to be attended with less danger than that of either the lion, elephant, or buffalo; and he supports this opinion by observing that both Kaffirs and Hottentots,

who but seldom care to molest a lion, never have the slightest hesitation in attacking a rhinoceros. The foregoing account is confirmed in all essential particulars by Sir John Willoughby, who suggests, however, that the rhinoceros is apt to be dangerous at certain seasons.

In Southeastern Africa Mr. Drummond states that both species of rhinoceroses generally leave their lairs about four o'clock in the afternoon, or, in districts where there are many human beings, somewhat later. They commence feeding in the direction of their drinking places, to which they travel by regular beaten paths, and arrive at the same somewhere about dark. If the drinking place is a mudhole they frequently refresh themselves with a roll, after drinking their fill. They then start for their favorite thorn feeding grounds, where they remain till daybreak, when they generally again drink. At an earlier or later hour after this, the time being to some extent dependent on the freedom of the district from human intrusion, they retire to their sleeping places, which they reach at any rate before the heat of the day. The lair is always in an extremely sheltered and deeply-shaded spot, and so heavily do they slumber that a practiced stalker could almost touch them with the muzzle of a gun, unless they are awakened by the birds which accompany them in search of the ticks with which they are infested. Mr. Hunter states, however, that in the Kilima-Njaro district rhinoceroses lie out in the open plain during the day.

The common rhinoceros is met with in Southern Africa generally either solitary or in family parties of two or three. In the latter case it is usually a female accompanied by her calf; but Sir J. Willoughby met a male, female, and half-grown calf together, and as in this instance the horns of the male were much shorter than those of the female, it may be that the longer horns generally belong to the latter sex. Occasionally several full-grown individuals are seen together, Mr. Drummond stating that on one occasion he met with a party of six or seven. Sir J. Willoughby relates that once he shot one of a pair of these rhinoceroses, which was immediately fiercely attacked and rolled over by its companion. When a cow rhinoceros is killed, the calf generally remains by the dead body of its parent, from which it can with difficulty be dragged away.

Like most other large African animals, the common rhinoceros is rapidly decreasing in numbers from the incessant pursuit to which it is subjected in the southern and eastern portion of the continent. Writing in 1881, Mr. Selous said that it was still fairly common in Southeastern Africa, although it had been nearly exterminated in the regions to the westward. Only a few then remained on the Chobe, while between that river and the Zambezi there were none, and the natives said that there never had been any in that district. Northward of the Zambezi they were, however, again met with, and from thence they doubtless extend through the whole of Central Africa to Abyssinia and the Sudan. In the Kilima-Njaro district Sir J. Willoughby's party found these rhinoceroses very plentiful in 1886, having on one occasion seen as many as sixteen head during a single day's march.

In Southern Africa the common rhinoceros is hunted either by being followed up when out feeding on the plains, or by the hunter lying in wait at its drinking places. In the Sudan the Hamram Arabs are, however, in the habit of chasing the

rhinoceros on horseback, and of hamstringing it by a dexterous stroke of a long two-handed sword. This sport, according to Sir S. Baker, tries the speed of the best horses, and that writer's account of the chase of a couple of these animals, which, after running more than two miles, defied further pursuit by escaping into thick cover, is probably known to many of our readers. An Arab hunter explained to Sir S. Baker, that at all times the rhinoceros was the most difficult animal to sabre, on account of his extraordinary swiftness, and, although he had killed many with the sword, it was always after a long and fatiguing hunt, at the close of which the animal becoming tired generally turned at bay, in which case one hunter occupied his attention, while another galloped up behind and severed the hamstring. The rhinoceros, unlike the elephant, can go very well upon three legs, which enhances the danger, as one cut will not disable him. A less sporting method adopted by the Arabs of the same regions is to dig a hole about two feet deep by fifteen inches in diameter in the animal's run, and to place in the centre a rather elaborately-constructed snare, to which is attached a rope with a heavy log of wood at the other end. When the rhinoceros steps on the pit, one of its feet is caught in the running noose. When caught, the first effort of the rhinoceros is to escape, and he forthwith pulls the log from the trench in which it was buried. "This log," writes Sir S. Baker, "acts as a drag, and, by catching in the jungle and the protruding roots of trees, it quickly fatigues him. On the following morning the hunters discover the rhinoceros by the track of the log that has plowed along the ground, and the animal is killed by lances or by the sword."

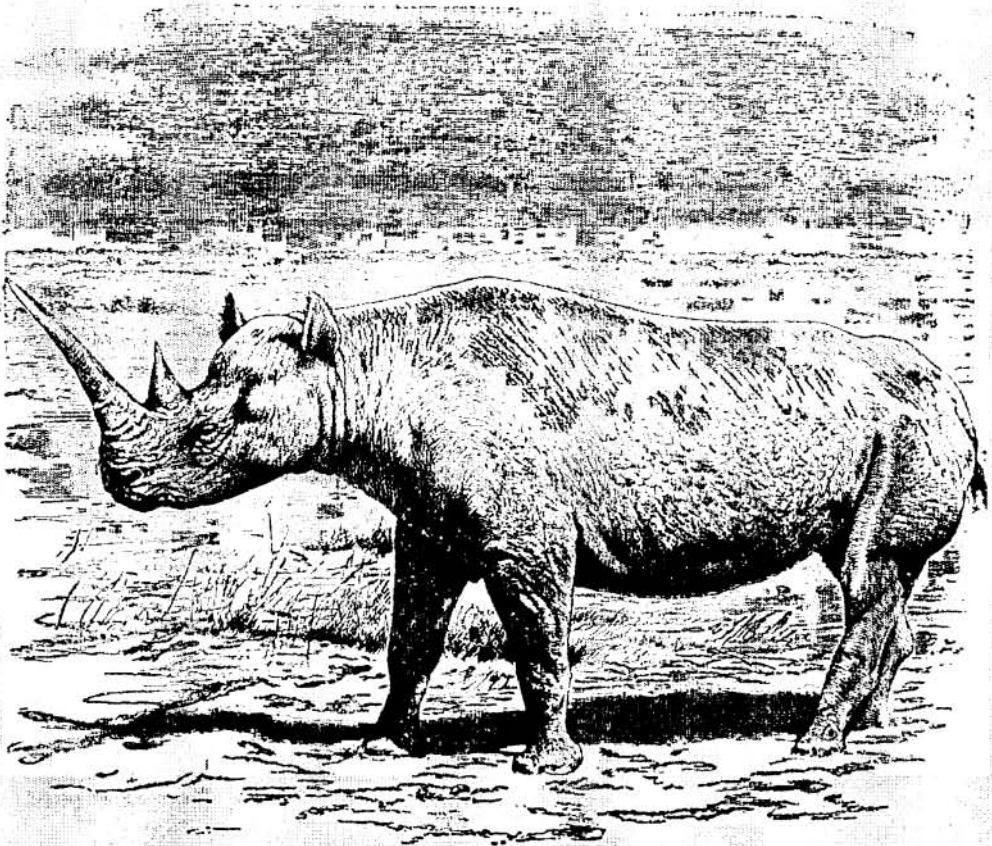
The same writer adds that the hide of a rhinoceros will produce seven shields; these being worth about two dollars each, as simple hide before manufacture. The horn is sold in Abyssinia for about two dollars per pound, for the manufacture of sword hilts, which are much esteemed if of this material. In South Africa the flesh of the common rhinoceros is much appreciated by the natives as food; but as the animal never has any fat, the meat is somewhat dry.

Like other members of the genus, this rhinoceros appears to be long lived even in captivity, a specimen from Nubia, acquired by the Zoological Society of London in 1868, having lived in the menagerie till 1891.

Extinct Ally The immediate ancestor of this species appears to have been the extinct thick-jawed rhinoceros (*R. pachygnathus*), of which a series of finely-preserved remains have been obtained from the well-known fresh-water deposits of Pikermi, near Attica, belonging to the Pliocene period.

Burchell's Rhinoceros The largest of the group is the square-mouthed, or Burchell's rhinoceros (*R. simus*), commonly known as the white rhinoceros, which is now, alas, practically exterminated. In addition to its great size, this species is characterized by its bluntly-truncated muzzle and the absence of a prehensile extremity to the upper lip, as well as by the great proportionate length of the head, which in large specimens is more than a foot longer than in the common species. Moreover, the nostrils form long narrow slits; the eye is placed entirely behind the line of the second horn; and the ear is very long, sharply pointed at the extremity, where it has but a very small tuft of hair, and has its lower portion completely closed for some distance, so as to form a tube. The front horn

attains a greater length than in the common species. In the skull the extremity of the lower jaw forms a much wider and shallower channel than in the *R. bicornis*, and the structure of the upper cheek-teeth is different. These teeth resemble in general structure those of the great Indian rhinoceros, having very tall crowns, with flat grinding surfaces, no distinct buttress at the front outer angle, and the outer portion of the middle valley cut off by a partition. They are, however, quite peculiar among existing species, in having a large amount of cement investing the interior and filling up the valleys of the crown. Moreover, the third molar in the



BURCHELL'S RHINOCEROS.
(One-thirtieth natural size.)

upper jaw, instead of being triangular in shape, closely resembles the tooth in front of it; a peculiarity found elsewhere only among certain extinct hornless species. In color Burchell's rhinoceros differs but little from the common species, the general hue of both being a slaty gray.

Dimensions In height this rhinoceros is known to reach six and one-half feet at the shoulder, and it is said that specimens were formerly obtained which slightly exceeded these dimensions. As regards length, our information is far from satisfactory. It has been stated that the length may be something between

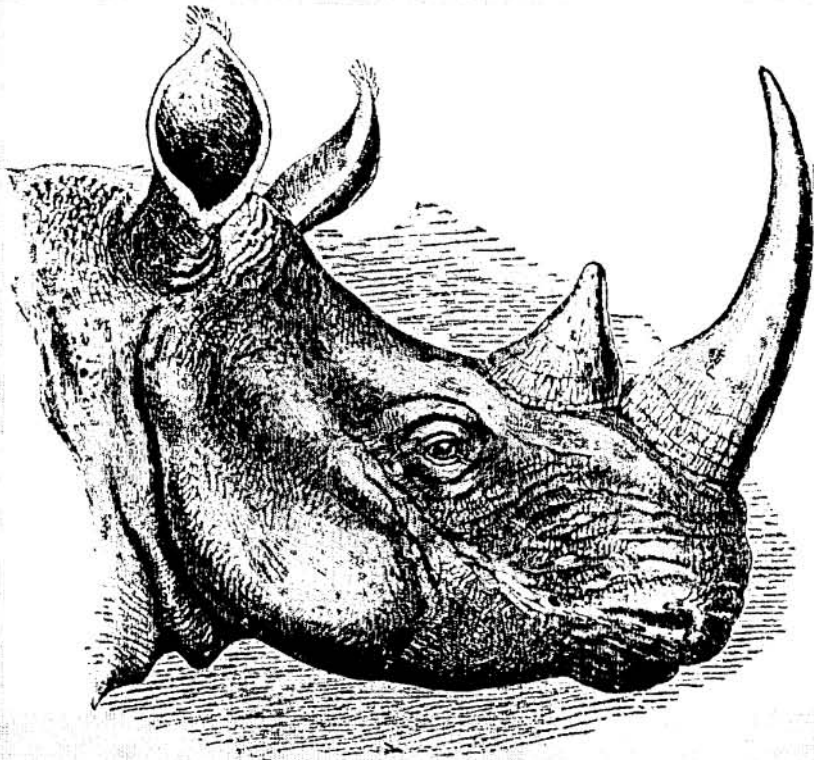
eighteen and nineteen feet; but this seems quite incredible, more especially as the proportions of our figure indicate that the length was rather more than double the height, which would make it about fourteen feet. One of the specimens referred to below has a length of twelve feet one inch, and a height at the shoulder of six feet two inches.

There is fully as much variation in the relative length of the horns as in the common species, the second horn being sometimes a mere stump, and at others attaining a length of two feet, while in some instances both are comparatively short. The front horn is, moreover, liable to considerable variation in shape. Thus, in the typical form of the species, it curves backward in a more or less bold sweep, as shown in our figure of the head, the individuals exhibiting this form being known to the Bechuanas by the name of *mohohu*. In other cases, as shown in our illustration of the entire animal, the front horn is nearly straight, with a forward inclination, specimens with this type of horn being designated by the natives as the *kabaoba*. When the anterior horn is straight and attains the length of about a yard, the point touches the ground as the animal walks along when feeding, and such horns consequently always show a flat surface on the front of the tip produced by friction. It was at one time considered that the *mohohu* and the *kabaoba* were distinct species, but Mr. Selous has shown not only that they consort together, but that there is a complete transition from the one type of horn to the other. As a rule, the horns of females are longer, and more slender than those of males.

The longest-known horn is one of the *kabaoba* type in the British Museum, of which the total length is fifty-six and one-half inches. The history of this specimen is unknown, but it has been in the collection for a very long period. Next to this is an example of the *mohohu* type recorded by Mr. Selous, of which the length is given as fifty-four inches. Other fine specimens of the front horn measure 44, 42 $\frac{3}{4}$, 40, and 38 $\frac{1}{2}$ inches. In examples where both horns have been preserved, the length of the front one in one case is thirty-seven and three-eighths and that of the back seventeen and seven-eighths inches, while in another these dimensions are thirty-three and thirteen inches. At the time when these rhinoceroses were abundant it was the ambition of every South-African chief to possess a long staff, or *kerrie*, made from a front horn; and it is, therefore, as Mr. H. A. Bryden suggests, highly probable that the largest dimensions recorded above may have been considerably exceeded.

Distribution The range of this rhinoceros was always limited, and apparently never extended north of the Zambezi; this restricted distribution being, as already mentioned, largely due to the creature's grass-eating habits. For the last seventy or eighty years it has been unknown to the south of the Orange river, but, according to Mr. Bryden, there is a tradition that it formerly roamed over the greater part of the Cape Colony. About the middle of the present century, when Gordon Cumming, and afterward Andersson, made their well-known hunting tours, Burchell's rhinoceros was comparatively common in parts of the Kalahari desert, Ngamiland, and various districts between the Orange and Zambezi rivers. Indéed, Gordon Cumming states that on one occasion he saw upward of twelve of these magnificent animals together in long grass, while Andersson and

Chapman speak of having shot as many as eight in a single night, while they were drinking at a water hole during the dry season. Mr. Selous remarks, however, that the numbers thus met with were probably drawn together from over a large tract of country, as at such times drinking places are few and far between. In 1874, Mr. Selous met with a considerable number of these rhinoceroses on the Chobe, but on again visiting the same district in 1877 he only came across traces of two, while in 1879 they had completely disappeared. In North Mashonaland there were, however, still a considerable number between 1878 and 1880, while others were to be met with in a small tract on the Sabi river in Southeastern Africa. About ten years



HEAD OF BURCHELL'S RHINOCEROS.
(After Selater.)

ago Mr. Selous was, however, only able to find a single specimen in Mashonaland, and it was then thought that this animal, which fell to his rifle, was actually the last of its race. In a remote corner of Mashonaland this indefatigable hunter found, however, some half-dozen individuals still living in 1892, two of which were subsequently shot by Mr. R. T. Coryndon. In the North Kalahari desert the species had been completely exterminated some years previous to 1890.

The extirpation of this rhinoceros is the more to be regretted since the museums are very badly off for specimens. It is, however, fortunate that Mr. Coryndon has succeeded in obtaining the skeletons and skins of two adult examples,

which are preserved in the British Museum and the Rothschild Museum at Tring; while there is also a stuffed specimen in the Museum at Leyden. In addition to a magnificent skull, with horns, the British Museum likewise possesses a fine series of detached horns.

Habits In treating of the common African rhinoceros, we have already had occasion to refer to the exclusively grass-eating habits of this species, and the consequent restriction of its habitat to open grassy plains. We have also alluded to its habit of walking with its head carried close to the ground, and likewise to the circumstance that the calf always precedes its mother when walking. It may be added that the mother appears to direct the course of her offspring with her long front horn. As regards its time of feeding and taking repose, the animals of this species closely resemble those of the ordinary kind. Mr. Selous states that "their sight is very bad, but they are quick of hearing and their scent is very keen; they are, too, often accompanied by rhinoceros birds, which, by flying about their heads, flapping their wings, and screeching at the same time, frequently give them notice of the approach of danger. When disturbed, they go off at a swift trot, which soon leaves all pursuit from a man on foot far behind; but if chased by a horseman they break into a gallop, which they can keep up for some distance. However, although they run very swiftly, when their size and heavy build are considered, they are no match for an average good horse. They are, as a rule, very easy to shoot on horseback, as, if one gallops a little in front of and on one side of them, they will hold their course, and come sailing past, offering a magnificent broadside shot, while under similar circumstances a prehensile-lipped rhinoceros will usually swerve away in such a manner as only to present his hind-quarters for a shot."

These animals were generally found in pairs or in parties of three, although as already mentioned, sometimes considerably more were seen together. Although, as we have seen, there is some difference of opinion as to the temper and disposition of the other species, all sportsmen agree that Burchell's rhinoceros was generally a harmless and inoffensive creature. Still, sometimes it would when wounded make a charge; and from the enormous size of the animal such a charge was a serious matter for those against whom it was directed. On one occasion Mr. Oswald caught sight of one of these rhinoceroses, and, putting spurs to his horse, soon came up alongside. He fired with good effect, but the animal, instead of attempting to escape, eyed its adversary for a moment, and then deliberately advancing, made a sudden rush at his horse, thrusting the long front horn completely through the animal's body, so that the point of the weapon struck the rider's leg through the flap of the saddle on the other side. Fortunately, Mr. Oswald was so little injured, that he was enabled to disengage himself from the body of his dead horse, and kill his formidable opponent.

When shot through the heart or both lungs, this rhinoceros, like the other species, Mr. Selous tells us, is quickly killed. If, however, the bullet penetrates but one lung, they will go on for miles, although blood may be streaming from their mouth and nose. Similarly, they will hold on their course, at first at a gallop and then at a trot, with a broken shoulder, for more than a mile; but a broken hind-leg

brings them immediately to a stop. The latter circumstance is somewhat at variance with Sir S. Baker's account of hunting the common rhinoceros in the Sudan, referred to on p. 1065.

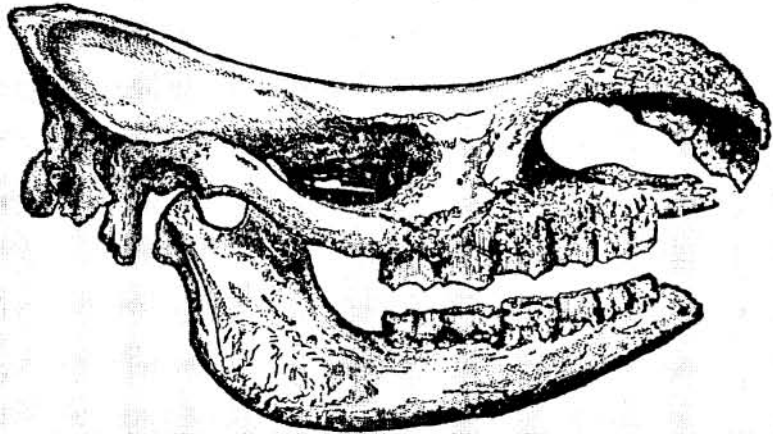
Burchell's rhinoceros differed from the other African species in that during the autumn and winter months, that is to say from March till August, it accumulated an enormous quantity of fat; and at such times its flesh is stated to have been of excellent quality, somewhat resembling beef, but with a peculiar and characteristic flavor of its own. The favorite dish was the hump on the withers, which was cut out and cooked with the skin on in a hole in the ground. The flesh of the calf was excellent at any season, and has been compared to very tender veal.

Certain very remarkable front horns of a rhinoceros obtained from Holmwood's Rhinoceros traders at Zanzibar, and doubtless belonging to an East-African form, may possibly indicate a third species, which may be known as Holmwood's rhinoceros. These horns, one of which measures forty-two inches, are characterized by their great length and slenderness, coupled with the small size of the base. It has been suggested that they are abnormal horns of the female of the common species, but it is quite probable that they belong to a totally different animal, which may be more nearly allied to Burchell's rhinoceros.

EXTINCT RHINOCEROSES

In the course of the preceding paragraphs, some reference has been made to certain extinct species of rhinoceroses which approximate closely to some of the existing members of the group. Besides these, there are, however, a multitude of extinct species,

which ranged not only over Europe and Asia, but likewise North America. It has, indeed, been suggested that America was the original home of these animals, from whence they migrated to Asia and Europe; but it appears to us that the evidence



SKULL OF EXTINCT RHINOCEROS FROM THE BRICK EARTH OF ESSEX.

is equally in favor of the migration having been in the opposite direction. These rhinoceroses occur throughout the Tertiary period as far down as the upper Eocene division; and even at that low horizon many of the species may be referred to the living genus, although in most cases they were unprovided with horns, while some

of them had four toes to each fore-foot. Rhinoceroses are, therefore, even more ancient animals than tapirs.

Mention has already been made of a rhinoceros from Greece, which was closely allied to the common living African species; but there were also several other extinct Old-World kinds resembling the existing African rhinoceroses in the presence of two horns and in the absence of front teeth, while in some cases there is evidence to prove that their skins were of the smooth type. One of the most remarkable of these species is the broad-nosed rhinoceros (*R. platyrhinus*) from the Siwalik Hills at the foot of the Himalayas, which was an enormous animal, with upper molar teeth resembling in structure those of Burchell's rhinoceros, although the last one was of the ordinary triangular shape. The other species, with molar teeth of similar type, is the woolly rhinoceros (*R. antiquitatis*), so called from the thick coat of woolly hair with which its body was covered. Skeletons, bones, and teeth of this species have been found in the cavern and other superficial deposits of the greater part of Europe, including England, while entire carcasses occur frozen in the ice of the Siberian "tundra." From these frozen specimens it has been ascertained not only that the skin was covered with woolly hair, but likewise that it was devoid of the permanent folds characterizing the Asiatic species. The horns of the woolly rhinoceros appear to have rivaled in size those of the living African Burchell's rhinoceros. From the structure of their upper molar teeth it may be inferred that both the broad-nosed and the woolly rhinoceros were grass eaters. In Siberia, however, portions of needles of conifers and of twigs of other trees have been found in the interstices of the molar teeth of the latter; from which it has been assumed that the animal was a branch eater. It is, however, quite probable that while in Siberia it may have been compelled from lack of its proper food to take to feeding upon leaves and twigs, yet that in the more southern portion of its range it resembled its allies in being entirely a grass eater.

During the Pleistocene period there were three other species of two-horned rhinoceroses without front teeth inhabiting England and other parts of Europe, which had upper molar teeth of the general type of those of the common African species, although their skulls were very different. Of these the Leptorhine rhinoceros (*R. leptorhinus*) and the Megarhine rhinoceros (*R. megarhinus*) are found in the brick earths of the Thames valley and other superficial deposits; while the Etruscan rhinoceros (*R. etruscus*) occurs in the somewhat older "forest bed" of the Norfolk coast, and likewise in the upper Pliocene beds of Italy and France. The Leptorhine and Megarhine species have tall-crowned cheek-teeth, and (as shown in the illustration on p. 1071) are characterized by the presence of a vertical bony partition in the skull dividing the two chambers of the cavity of the nose. In this respect they resemble the woolly rhinoceros; a rudiment of the same feature also occurring in the living Javan rhinoceros. The Etruscan rhinoceros, on the other hand, has shorter-crowned cheek-teeth, and no such bony septum in the nasal cavity. That all these three species browsed on leaves and twigs may be pretty confidently asserted from the structure of their upper molar teeth; while a carcass found embedded in the ice of Siberia belonging to either the Leptorhine or the Megarhine species, shows that these had smooth skins like the living rhinoceroses of

Africa. The Deccan rhinoceros (*R. deccanensis*) and the Karnul rhinoceros (*R. kar-nuliensis*), from the superficial deposits of Southern India, indicate that smaller representatives of the two-horned branch-eating group likewise inhabited that country.

Reference has already been made to the occurrence in the Miocene deposits of Europe of an extinct two-horned rhinoceros provided with upper and lower front teeth, which was allied to the living Sumatran species. Throughout the middle Tertiary rocks of Europe, as well as in the Pliocene and Miocene of India, there are found, however, a number of rhinoceroses differing from any living species in the total absence of horns, while in those cases where their limbs are known the fore-feet were provided with four toes. Some of these animals were of very large size, and all of them had molar teeth of the type of that represented in the upper figure on p. 1051 (which belongs to one of the Indian species), and their jaws were furnished with large front teeth. Moreover, in one of the Indian representatives of this hornless group, the last molar tooth was of nearly the same form as that in front of it, instead of being triangular. That all these species subsisted on leaves and boughs, may be inferred from the structure of their short-crowned molar teeth; and it may be observed here that all the older Ungulates had short-crowned cheek-teeth, adapted for champing twigs and leaves rather than for masticating grass; whence it may be concluded that grassy plains are probably a comparatively-recent feature in the history of our globe. Hornless rhinoceroses also occur in the Tertiary deposits of North America, but at least the majority of these resembled existing types in having but three toes on each fore-foot; while their limbs were relatively shorter than in their Old-World allies, and their bodies more elongated. Finally, there were certain other small rhinoceroses from the lower Miocene of both Europe and the United States, in which the front of the skull carried a very small pair of horns placed transversely instead of longitudinally.

The above are all the forms which can be included in the genus *Rhinoceros*. There are, however, a number of allied extinct animals which connect the true rhinoceroses with more generalized extinct types of Odd-Toed Ungulates. Such for instance is the *Amyndon*, from the Miocene Tertiary of North America, which was a rhinoceros-like animal with no horn, and the full typical number of forty-four teeth. That is to say, there were three incisors, a tusk, and seven cheek-teeth on each side of both jaws; the front teeth being like those of ordinary Mammals, and not having the peculiarly-modified form presented by those of the true rhinoceroses. Moreover the whole of the three upper molar teeth were alike; and none of them had the processes projecting into the middle valley which are found in those of all true rhinoceroses. Probably the *Amyndon* also occurred in the lower Miocene and upper Eocene rocks of France. There were other allied types, but the above example is sufficient to show that the earlier rhinoceroses were far less different from tapirs and some extinct generalized forms to be noticed later on than are their modern representatives.

We must not, however, take leave of the Rhinoceros family without referring to a most remarkable creature known as the *elasmotherium*, which flourished during

the Pleistocene period in Siberia. This creature was probably as large as Burchell's rhinoceros, and like that species had no teeth in the front of the jaws. The skull had a bony partition in the cavity of the nose, and carried on the forehead an enormous protuberance which, during life, doubtless supported a horn of very large size. The most remarkable feature about the elasmothere is, however, to be found in the structure of its cheek-teeth, which while formed on the type of those of the rhinoceroses, are greatly elongated, and have their enamel so much folded as to present some resemblance to those of the horse. Indeed, the elasmothere may be regarded as a highly-specialized grass-eating creature, presenting a relationship to an ordinary rhinoceros somewhat similar to that which the horse exhibits to certain extinct Ungulates.

THE HORSE TRIBE

Family *EQUIDÆ*

Under the general title of horses, zoologists include not only the animals to which that name is restricted in ordinary language, but likewise the asses, zebras, and quaggas, together with certain nearly-allied extinct animals. All these are characterized by having very high-crowned cheek-teeth, in which the enamel is thrown into a series of complicated foldings, and the deep valleys between the component columns completely filled up with cement. In the upper cheek-teeth, as shown in B and C of the accompanying figure, the outer columns, (*pa, me*) of each tooth are flattened, and the premolars somewhat exceed the molars in size; while in the lower jaw the ridges are crescent-like, although much complicated by the foldings of the enamel. So different, indeed, are the molars of the horses from those of other Odd-Toed Ungulates, that it is at first sight somewhat difficult to realize their fundamental unity of structure. A comparison of the three figures in the accompanying illustration will, however, clearly indicate how the structure of the tall-crowned molar of the horse is essentially the same as that of the low-crowned molar of the extinct anchithere, while that of the latter does not differ very widely from the molars of the rhinoceros represented on p. 1051. Remembering that the figured molar of the anchithere belongs to the opposite side of the jaws to those of the horses, it will be apparent that it would only require a heightening of its columns and ridges; accompanied by the formation of a series of foldings in their investing enamel, and the filling up of the deepened intervening valleys with cement, to produce a very similar type of tooth. It is almost superfluous to add that the tall-crowned molars of the horse, with their completely-filled valleys and their alternating ridges of harder and softer constituents, are far more efficient instruments of mastication than the low-crowned teeth of the anchithere, with their perfectly-open valleys. Indeed, while the horse's are adapted for a grinding action, and have nearly flat surfaces, the anchithere's molars are suited to a champing motion, and have ridged surfaces.

Incisors Another peculiarity in the dentition of the horses is that the incisor or front teeth in both jaws have an infolding of the enamel at the summit of their crowns, as shown in the figures A, B, C, on p. 1078. This peculiar