LIFE-HISTORIES
OF
AFRICAN GAME ANIMALS

BY

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WITH ILLUSTRATIONS FROM PHOTOGRAPHS, AND FROM DRAWINGS
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CHAPTER XX

THE HOOK-LIPPED OR BLACK RHINOCEROS

Rhinoceroses

Family *Rhinocerotidæ*

All of the living rhinoceroses are ponderous, thick-skinned mammals armed on the snout by one or two dermal horns. The structure of the horns is peculiar among mammals and quite unlike either the bony horns of the deer or the hollow, chitinous horns of antelopes and their kindred. The horn of the rhinoceros is made up of a compact, hard mass of agglutinated, hair-like fibres which are an outgrowth from the skin. The horns receive no bony support from the skull but rest on the nasal bones, where they are firmly held in place by their continuity with the thick skin of the snout. A slight concession, however, is made toward their support by the part of the nasal bones upon which they rest, this portion being set with numerous small, bony tubercles. So constant are these bony tubercles that paleontologists are enabled by such evidence to determine the presence and position of horns of extinct species. The horns are not strictly a family character, although so prominent a feature of the later forms, for some of the oldest genera were quite hornless. Rhinoceroses are evenly three-toed, and are members of the odd-toed or perissodactyl division of the hoofed mammals. In the structure of their feet they are fairly closely allied to the tapirs and distantly

to the modern horses, only the remote ancestral forms of which were three-toed like the rhinoceros. In shape of body the rhinoceros is not very unlike the hippopotamus, the body being almost equally long, but the legs are in most of the forms decidedly longer, so that the animal is capable of travelling at really astonishing speed considering its immense size. The skin is very thick, dense in texture, and usually quite hairless. The skin of the two African genera resembles in general appearance that of the elephant, but it is of a very different quality, being much denser and more armor-like. The hair is confined in the existing species chiefly to the tips of the ears and the tail, but the recently extinct woolly rhinoceros, which lived far north in Europe and Asia, was clothed by a coat of long hair to protect it from the cold. In dental characters the various genera of rhinoceroses exhibit much diversity, but the cheek-teeth show a peculiar pattern of folds which are characteristic of the family. The great bulk of the genera had well-developed incisor teeth in both jaws, and some of the very ancient types had canine teeth as well, but the living African forms lack all indication of either incisor or canine teeth. The cheek-teeth usually consist of the full number found in mammals, that is, four premolars which have milk predecessors and three molars. The premolars and molars are quite alike in shape and size, except the first premolar which is usually small and sometimes wanting. The cheek-teeth, as a rule, are composed only of dentine and enamel and are broad-crowned, the crowns being thrown into two transverse folds projecting inward with deep valleys separating them. Certain forms, however, such as the white rhinoceros of Africa and the woolly rhinoceros of the boreal

regions, have in addition to the dentine and enamel a thick layer of cement which enters to an important degree into the composition of the teeth. Such teeth represent the highest specialization in rhinoceroses, and have long crowns in which the folds are united so as to enclose the cement layer as islands surrounded by enamel. Rhinoceroses are, without doubt, long-lived forms, but little data, however, are available upon which to base an estimate of the length of life of an individual in its native state. As they are not known to breed in captivity, practically nothing is known regarding the length of the period of gestation. But one young is produced at a birth. In body size the female is but little inferior to the male. The mammæ are two in number.

The extinct forms of rhinoceroses are very numerous, many different genera being represented throughout North America, Eurasia, and Africa, but so numerous have been the lines of divergence that it is quite impossible to trace back through the maze of forms any of the modern genera. The most ancient genera were contemporaneous in the Oligocene in both Eurasia and North America, but in the latter country they died out early in the Pliocene. In Eurasia the family persisted to the present time, and the modern Asiatic forms were evolved there during the Pliocene and Pleistocene. Africa, no doubt, also played an important part as a field of rhinoceros evolution, but, owing to the almost complete absence of fossil-bearing deposits in that continent, this is chiefly a matter of conjecture. The black rhinoceros has been reported by Scott from the Pliocene of Natal, and two other fossil species are described by Pomel in the Pleistocene of Algeria. A more significant discovery,

however, is that made by Oswald,* recently, of a tooth of one of the ancient hornless rhinoceroses in Miocene beds at Karungu on the east shore of the Victoria Nyanza. This discovery seems to indicate nearly as great antiquity to the rhinoceros in Africa as in either Eurasia or America. The living species are confined to southern Asia, Sumatra, Java, Borneo, and Africa south of the Sahara Desert. Until very recently Siberia and northern Europe were the habitat of the woolly rhinoceros, which was contemporaneous with early man. The one-horned species of India and Java seem always to have been limited to southern Asia and the adjacent islands, in which region alone have fossil remains of allied one-horned species been found. Two-horned rhinoceroses, however, are found quite as wide-spread as the geographical limits of the family. The African genera, both of which lack teeth in the front part of the jaws, are not met with in a fossil condition beyond the limits of Africa, and they no doubt represent types peculiar to the Ethiopian region.

Key to the Living Genera in Africa

Skull short, the posterior part not produced beyond the condyles; snout produced into a pointed lip; nape of neck normal in outline; teeth without the cement layer and with deep ridges on the inner side separated by open valleys; the first premolar persisting, the cheek-teeth being seven on each side; base of first horn rounded in front. *Diceros*

Skull greatly lengthened, the posterior part produced far beyond the condyles; snout ending square in front, the mouth being broadly truncate; nape of neck marked by a prominent fleshy hump; teeth with a thick cement

* 1913. *Journ. E. Africa and Uganda Nat. Hist. Soc.*, vol. III, No. 6, p. 4.

layer, the crowns solid and rectangular in shape, the valleys being filled with cement; first premolar shed early, the cheek-teeth in the adult being six on each side; base of first horn square in front

Ceratotherium

Black Rhinoceros

Diceros

Diceros Gray, 1821, London Med. Repos., vol. XV, p. 306; type *Rhinoceros bicornis.*

The black rhinoceros differs so widely in many important details of its structure from the other living forms that it has been found necessary to separate it generically from them. It has been the custom of naturalists to include all the living forms in one genus, *Rhinoceros*, owing to the small number of species. This has been done merely as a matter of convenience, but we feel that the more logical course is to classify the various forms on the merits of their structural differences or affinities so as to balance them with other groups. Such a division into several genera will also facilitate the tracing of their relationships with the numerous fossil forms. In conformity with the white and the Sumatran, it carries two dermal horns on the snout, the rear one being situated directly behind the front one and usually is much smaller and compressed laterally into a blade-like knob. The genus *Diceros*, of which the black rhinoceros is the type, differs almost as radically from the other African genus, *Ceratotherium*, or white rhinoceros, as from either the single-horned Indian or the two-horned Sumatran rhinoceroses. It differs from the white by having a short head which is deeply concave in profile on the top owing to the great elevation of the occipital part. In these two characters it resembles the Asiatic one-horned and two-horned genera, but differs from them by its want of incisor teeth and the distinctness of the post-tympanic process. The genus is much less specialized than *Ceratotherium;* its short skull and the simple structure of its short-crowned teeth ally it much more closely to the remote ancestral forms. The black rhinoceros in its dentition still shows traces of the incisor teeth, and occasionally also of canines,

but such teeth persist as mere rudiments beneath the gums and never become functional. A more permanent feature of this sort is the persistence of the first premolar throughout life. The genus to-day is represented by a single species, *bicornis*, and is confined to Ethiopian Africa, but in the Pleistocene it occurred as far north as Algeria in the Mediterranean region. Besides the Pleistocene species of Algeria another has been described from Northern Rhodesia by Chubb, which is smaller but closely allied to the living *bicornis*. Scott described some cheek-teeth of a rhinoceros from the Pliocene of Natal, which he referred to a new species, but they are quite indistinguishable in size or shape from those of *bicornis*. It is evident from these discoveries that *bicornis* has long been an inhabitant of Africa and doubtless is a form which originated on that continent.

The black or common African rhinoceros was fairly plentiful in most parts of East Africa which we visited; there were stretches of territory, however, in which we found none, as, for instance, on the Uasin Gishu. Why the species was absent from these places we cannot say, for elsewhere we came across them in all kinds of country. They were found in the dense, rather cold forests of Mount Kenia; they were found in the forest country near Kijabe; they were common in the thick thorn scrub and dry bush jungle in many places; and in the Sotik and along the Guaso Nyiro of the north, as well as here and there elsewhere, they were to be seen every day as we journeyed and hunted across the bare, open plains. "Plentiful" is, of course, a relative term; there were thousands of zebras, hartebeests, gazelles, and other buck for every one or two rhinos; it is doubtful whether we saw more than two or three hundred black rhinos all told, and we do not remember seeing more than half a dozen or so on any one day. Probably they were most abundant in the brush and forest on the lower slopes

of the northern base of Kenia, where, however, they were hard to see. They prefer dry country, although they need to drink freely every twenty-four hours.

Apparently the cow does not permit her old calf to stay with her after the new calf is born. We never saw a cow with two calves of different ages (or, for the matter of that, of the same age); yet many times we saw a cow followed by a half-grown or more than half-grown beast that must have been several years old. Generally we found the bulls solitary and the cows either solitary or followed by their calves. Occasionally we found a bull and cow, or a bull, cow, and calf, together. There is no regular breeding time; the calf may be produced at any season. It follows its mother within a very few days, or even hours, of its birth, and is jealously guarded by the mother. When very young any one of the bigger beasts of prey will pounce on it, and instances have been known of a party of lions killing even a three parts grown animal. The adult fears no beast of the land, not even the lion, although it will usually move out of the elephant's way. Yet the crocodile, or perhaps a party of crocodiles, may pull a rhino under water and drown it. Mr. Fleischman, of Cincinnati, not merely witnessed but photographed such an incident, in the Tana River, where the rhinoceros was seized by the hind leg as it stood in the water, could not reach the bank, and after a prolonged struggle was finally pulled beneath the surface. Such an occurrence must be wholly exceptional; for the rhinoceros shows no hesitation in approaching deep water, not merely drinking but bathing in it.

The animals are fond of wallowing in mud holes, and also at times in dusty places. Often the dung will be

dropped anywhere, if the rhino is travelling much; but where a rhino, as is often the case, is spending its whole time in one rather limited locality, it returns again and again to the same place to dung. It kicks and scatters the dung about with its hind feet—not its horn. In one place we found a cow rhino which had evidently been living for many weeks in the river-bottom of the Athi. There was plenty of food in the brush jungle which filled the spaces between the trees, and which afforded thick cover; there was abundant water in pools near by; and evidently the rhino had kept close to the immediate neighborhood. The dunging place was kicked and ploughed up, and it looked as if the beast had rolled and wallowed much, in addition to kicking around the dung. This rhino spent its time in the immediate vicinity of its drinking-place, and during most of the day lay up in the dense shade of the green river-bottom jungle, apparently feeding at night and in the early morning and late evening. In other localities the animals differed in their habits. On the Northern Guaso Nyiro we found the rhinos drinking once every twenty-four hours, at night, and then travelling back at a good gait in a fairly direct course for eight or ten miles into the wastes of leafless thorn scrub, upon which they fed and in which they passed their noon-day hours of rest. In the Sotik the rhinos spent their whole time in the bare, open plains, drinking at one or another of the widely scattered, rapidly drying little pools. They usually drank at dusk; that is, about nightfall, and again about sunrise. Sometimes during the noon hours they lay out in the open, without a particle of cover; sometimes they lay under an acacia, or wild olive, or candelabra euphorbia. They sometimes stood while resting, but usually lay down,

either on their sides or in a kneeling position. They not only fed on the thorny, partially leaved twigs—the black rhino is a browser, whereas the white rhino is exclusively a grazer—but also fed greedily in the bare plains on the low-growing, shrubby plants, only a few inches high, with woody stems. I do not believe that they were really grazing, but together with the shrub stems they cropped they swallowed the tough jointed grass. They also ate aloes and a kind of prickly euphorbia with a blistering juice; it is hard to understand how even their palates could stand the thorns and the acrid sap. We saw them feed at noon; once we stumbled on one feeding by moonlight; but their favorite feeding times were in the morning and afternoon.

Like other game, rhinos are assailed by various insect pests. Biting flies annoy them much; even when resting their ears are usually in motion to drive away their winged assailants. The ticks swarm on them; loathsome creatures, swollen with blood, which might be so crowded under the armpits, in the groin, and in the soft parts generally that they looked like mussels on an old dock. We do not quite understand why the tick-birds fail to keep down these ticks. These tick-birds, rather handsome, noisy creatures, are in most places the well-nigh invariable attendants of rhinos when the latter dwell on the plains or in fairly open bush. They clamber all over their huge hosts, like nuthatches round a tree trunk, and usually go in flocks. So invariably are they attendants upon the big game that if we heard them chattering as we threaded our way among bushes we were always at once on the alert to see a rhino. Sometimes they are wary, and chatter and fly off on seeing the hunter; at other times they pay but little heed; and the rhino may

or may not have its suspicions aroused when they fly away. If a party is seen on the wing, by watching their flight until they light it may be possible to discover the rhino.

The hook-lipped rhino is dull of wit and eyesight. Its sense of smell is good, and so is its hearing; but its vision is astonishingly bad. We doubt if it sees better than a very near-sighted man. Again and again we have walked up to one, on an absolutely bare and level plain, to within a hundred yards without its paying the least heed. We wore dull-colored clothes, of course, and made no abrupt motions; but it was unnecessary to take advantage of cover until we were well within a hundred yards. In thick brush it is often difficult to approach, for all bush-dwellers are harder to approach than plains-dwellers, as they cannot be seen until within a distance so short that both their hearing and their smell have in all probability given them warning. But in all places, bush, forest, and open plain, it is the easiest to approach of all the creatures that dwell in that particular habitat, because of the dulness of its brain-matter and the poorness of its vision. It is the most stupid of the very big creatures. It seems to have a marvellous memory for local geography, as is shown by the way it will traverse many miles of country to some remote water-hole in the middle of a vast and monotonous plain; and it has the patience to stand motionless for many minutes listening for anything suspicious. But these seem to be well-nigh its only lines of mental effort. Its life is passed in feeding, travelling to and from water, sleeping, and when awake and at leisure either fidgeting, or much more often standing motionless to rest. There is occasional love-making and the exhibition of occasional fits of truculence and petulance or of muddled curi-

osity. When one rhino comes within ken of another the meeting always betrays bewilderment and incipient defiance on the part of both. Apparently the first suggestion that another rhinoceros is in the neighborhood always arouses suspicion and potential resentment in the bosom of the rhinoceros to which the suggestion comes. Usually the rhino which has heard, smelt, or dimly seen another trots toward it quickly and then stands motionless for some minutes close to it, in the effort to decide whether to adopt an attitude of indifference or hostility—indifference almost always carrying the day. They are silent beasts, but very rarely utter a kind of squeal or squeak, apparently when courting. They utter a shrill and long, often a steam-whistle scream when dying; and they make a succession of puffs or snorts while charging or even when only startled.

The recognized presence of men rouses in the rhinoceros several emotions, which in the order of their intensity we should put as bewilderment, fear, dull curiosity, and truculence. If the men are merely seen, usually the only emotions aroused are bewilderment and curiosity; if smelt, fear is the usual result; but in a certain number of cases even the sight or the smell of men arouses senseless rage. Some rhinos are always cross and evil-tempered; but many others which are normally good-natured now and then have fits of berserker fury. Anything conspicuous which arouses their interest may also arouse their hostility. White has an evil attraction for them. Our friends the McMillans, while travelling through a rhino country, found that the two white horses of their cavalcade were so frequently charged that they finally painted them khaki-color. We have never seen them charge other game, and gazelles and hartebeests feed

in their immediate neighborhood with indifference; yet we have been informed by trustworthy eye-witnesses of one rhinoceros charging a herd of zebra, and another some buffalo. The rhinoceros gets out of the way of the elephant. It will unquestionably on occasions charge men and domestic animals entirely unprovoked. Twice we have known of one charging an ox wagon; in one case an ox was killed; in the other the rhino got entangled in the yokes and trek tow, and the driver, an Africander, lashed it lustily with his great whip, until it broke loose and ran off, leaving the ox-span tumbled in wild confusion. The year before we were at Nyeri one killed a white man, a surveyor, near that station, charging him without any provocation at all. At that time all the rhinos in that immediate neighborhood seemed to suffer from a fit of bad temper; they kept charging any one they met, and killed several natives. At last the district commissioner undertook a crusade against them, and killed fifteen, evidently including the various vicious ones, for from that time all attacks on human beings ceased. Rhinos frequently attack the long lines of porters on a safari, if they pass to windward of it. Probably this is not, as a rule, done from ferocity, but from angry bewilderment, the rhino finding the scent of man in his nostrils whichever way he goes, and finally thinking he is surrounded, and charging the line. Usually he merely runs through the line, tossing any porter who happens to be in his way; but he may grow irritated and turn and hunt down a porter. One man was thus killed while we were in Africa. Von Höhnel, the companion of Teleki and Chanler on their explorations, was on one occasion thus hunted down and very badly wounded by a cow rhino which had charged through the safari and had

then returned on her footsteps. Mr. Hurlburt, the head of the American mission at Kijabe, had been wantonly charged by a rhino which killed his mule.

A dozen times we came across rhinos while we were on safari, or while we were on the trail of game. In such cases one of us kept watch over the rhino, rifle cocked, while the safari, or, if we were hunting, the trackers, marched so as to keep to leeward. Once or twice the rhino never noticed us. On the other occasions the beast saw us, but dimly, and evidently could not make out what we were. It would gaze toward us, head and tail up, and ears forward, and make little runs to and fro, perhaps even advancing a few yards; but in no case did the beast actually charge. In one instance, however, it did charge and toss a man, a few minutes after we had left it. This was a rhino we had come across while we were trailing a buffalo herd. Cuninghame did not wish to leave the trail, so Colonel Roosevelt went toward the rhino, and by waving his hat and shouting—not too loud, for fear of scaring the buffalo—he finally made it move off a couple of hundred yards, and he and Cuninghame went on unmolested. But a quarter of an hour afterward three of the porters returned to look for a knife which one of them had dropped while we were engaged in frightening away the rhino; and this time the brute came for them, and tossed one, goring him in the thigh, and then galloped on without turning. Whenever they got our wind they always ran, except on one occasion when a cow rhino advanced on us, unprovoked, from thick brush, tossing and twisting her head. We are not sure that she meant to charge; but when she got within forty yards we grew unpleasantly uncertain as to her intentions and shot her.

Stewart Edward White states that on one occasion, near the Tana River, he struck a locality where rhinoceros after rhinoceros charged quite unprovoked, and he had to shoot half a dozen. We have known a rhino charge through a camp at night and cause wild panic; they not infrequently charge hunters or travellers after dark.

Personally, we consider the rhinoceros the least dangerous of all really dangerous game, although many good hunters hold the contrary view. The first one any of us saw, a bull, charged savagely when mortally wounded at a distance of a little over thirty yards, and was killed just thirteen yards from the hunter. But we were never really charged again. Colonel Roosevelt hit and knocked over one animal which we had stalked, as it was galloping toward us at a distance of seventy or eighty yards, but we think that this rhino was curious rather than enraged, and would not have charged home. Kermit was charged by one which he had mortally wounded, but it turned upon receiving another and much slighter wound. Two or three of our American friends who have hunted in East Africa have had narrow escapes from rhinos which charged after being wounded, or when the effort was made to photograph them.

Unquestionably, compared to his mild and placid square-mouthed kinsman, the hook-lipped rhino is a fidgety, restless, irritable, and at times dangerous, creature. Yet his occasional truculence is more than offset by his stupidity and dull eyesight, so far as the actual contest with the hunter is concerned. As far as we know but one white man has ever been killed while hunting rhinos in East Africa (the English official already mentioned was not hunting the beast which killed him). This was a German,

BLACK RHINOCEROS TOSSING A PORTER, NORTHERN GUASO NYIRO DISTRICT
From a drawing by Philip R. Goodwin

Doctor Kolb, who killed scores of rhinos, and was finally mortally hurt by a cow which, upon being wounded, charged him and thrust her horn through his stomach. An English official was also crippled for life by a rhino he had wounded. In dense bush a rhino is undoubtedly a dangerous antagonist at times, as well as being difficult to approach. On the open plains we found them easy to approach and easy to kill, and only occasionally dangerous; they were slow to detect us, and then spent some moments deliberating before concluding either to make off or to charge. But though less dangerous than other dangerous game when hunted, the rhinoceros is more prone than any other beast to act aggressively when entirely unprovoked. The very stupidity and dulness of sense which tend to render his truculence of little danger to the hunter immensely add to the menace which that truculence contains for the non-hunter, the wayfarer, who stumbles across him. He fails to make out the man until close by, and then waits, stupid and curious, until he suddenly thinks himself menaced, or is excited to rage by seeing the stranger near at hand, and forthwith charges. There are some rhinos which charge from sheer wickedness; but we are convinced that stupidity and curiosity are chiefly responsible for the conduct of the average rhino, which makes people think that it is about to charge them. When it does charge, however, it shows astonishing speed and agility for such an apparently unwieldy animal, whipping round in its tracks like a polo pony, and galloping at a pace that forces a horse to stretch himself. If it loses sight of the man it will sometimes quarter for him like a pointer dog, swinging its large head near the earth and snuffing for his tracks. The 'Ndorobo told us that they found the rhino more dan-

gerous to assail than the buffalo, because it often had to be attacked where there were no trees.

The rhinoceros, unlike the elephant and buffalo, does not haunt the neighborhood of the negro villages, to make raids on the fields and gardens. It is a beast of the lonely wastes. Even in the dry desert it is at home if there is an occasional pool of water; and it is only at these desert drinking-pools, when driven thither by thirst, that the solitude-loving beasts are found in any number. A score or over may congregate at night round such a pool, to which each has trodden his path through a dozen miles of barren wilderness; and there they may fight for the water. If two or three rhinoceroses—a cow and calf, or a bull and a cow, perhaps with a calf—come to such a pool together they do not loiter in the neighborhood. But we have seen a single rhino remain by such a pool, motionless for an hour, until another appeared, when the two beasts approached each other, as if for company. It seemed as if they had each known that the other would come there about that time, and had reckoned on the meeting. We have seen the same thing with other game, where one individual waited with evident expectancy, as if at a rendezvous, until another of the same species appeared. But of course it is possible that in these cases the waiting animal's keen senses made it aware that the other was somewhere in the neighborhood long before the onlooker could discern the faintest hint of its presence.

KEY TO THE RACES OF *bicornis*

Size larger, the skull exceeding 21 inches in length; concavity of upper profile deep, more than 2 ¼ inches *bicornis*

Size smaller, the skull 20 inches or less in length; concavity of upper profile 2 inches or less in depth *somaliensis*

Typical Black Rhinoceros

Diceros bicornis bicornis

Native Names: Swahili, *faru;* Masai, *emune;* Kikuyu, *huria;* Kikamba, *mbuzya.*

Rhinoceros bicornis Linnæus, 1758, Systema Naturæ, 10 ed., p. 56.

Range.—In East Africa from German East Africa northward to the south bank of the Tana River, westward through northern Uganda as far as the east bank of the Nile, and north as far as Mongolla and the north end of Lake Rudolf; west of the Victoria Nyanza the northern distribution is limited by the Kagera River; absent from Uganda proper, the Kavirondo country, and the moist, tropical coast belt from the Sabaki River southward.

The black rhinoceros has an extensive range in Africa from the Cape region northward to Upper Egypt and from the East Coast westward to Nigeria. It is lacking throughout the whole Congo basin and also locally throughout much of the range as here defined. Large rivers have a peculiar effect in limiting its dispersal locally. In the upper Nile region it is found only on the east bank and in northern German East Africa it is found no farther north than the south bank of the Kagera River. Moist or damp tropical districts seem to be distasteful to it, and on this account it is lacking from the Congo basin, central and western Uganda, and the moist strip of lowland flanking the East Coast from Mombasa southward. Dense upland forest is also avoided by them, although they may be found at times in the lower parts of such forests or in thick bush bordering them.

The black rhinoceros is still found in Upper Egypt in the provinces of Kassala and Senaar and also in the Lake Chad region. From the Cape region of South Africa it seems to have been first made known to European civilization in 1650. At the present time it is quite extinct in the Cape Colony and the region just north of it, and is not found in a wild state except in remote districts near the Zambesi River. Formerly, in this region, the rhinoceroses were separated into two races, on the basis of horn shape, the normal one in which the front horn greatly ex-

ceeded the rear one being considered the common species and those having the two horns of nearly equal size being the keitloa race. These distinctions, however, have long since been abandoned, and to-day a single form is recognized throughout the greater part of Africa and another smaller one in the desert region of East Africa and Somaliland. The horns everywhere show great diversity of shape and no dependence for racial characters can be assigned to them. This is owing, in a measure, to their being skin structures solely without any definite connection with the bony structure of the skull. They thus have great freedom of form and position and show decided variation in number at times. Three-horned specimens are occasionally met with, and a five-horned one has recently been recorded. This one is described by Rowland Ward in his well-known "Records of Big Game," who quotes the original discoverer to the effect that besides the two front horns the three rear horns which follow are good-sized, the shortest being nine inches long, but they are not all in line; some spring laterally from the bases of the others.

Speke and Grant met with great numbers of black rhinoceroses in Karagwe, just west of the Victoria Nyanza and south of the Uganda boundary in what is now German territory. Besides the black species they fancied that the white also inhabited this district, and they referred certain long-horned specimens of the black to that species. In their account of the game animals met with they state accurately the well-known difference in the shape of the lips in the two rhinoceroses, but give a figure of a typical pointed-lipped rhinoceros head as that of a white specimen. The same region was visited by Stanley some years later, and he also gives an account of the great numbers of rhinoceroses met with and the killing of several for food. He refers to some of the specimens as white, his statement referring merely to their color, he being apparently quite unaware of the existence of the species to which sportsmen have applied the name "white." Since these early days several sportsmen well acquainted with the distinguishing characters of the two species have visited Karagwe and have found only the black species in the district.

The black rhinoceros of East Africa is occasionally re-

ferred to in natural-history literature as a race, *holmwoodi*, described by Sclater in 1893, and based on two extremely long front horns having a length of more than forty inches, and obtained by purchase at Zanzibar by Holmwood. The describer of the species supposed the horns to belong to a distinct race having very long and slender front horns. They, however, represent merely the extremes in length of several hundred horns which have reached Zanzibar as articles of trade accumulated by safaris in the interior of the continent. As the rhinoceroses of East Africa are not distinguishable by horn characters or by size from those of South Africa, the name *holmwoodi* is at present not applicable to any race. We have examined several skulls of black rhinoceroses from South Africa in the British Museum and have found them quite indistinguishable from specimens from East Africa.

The black rhinoceros has not received its common English name because its coloration is actually blacker than that of other species, but rather to contrast it with the other African rhinoceros which has been so unfortunate as to have the designation of "white" bestowed upon it. Under these circumstances we may describe the black rhinoceros as slightly blacker than the white one, but both would be considered black in color by the average observer. The color of the skin of the black rhinoceros, upon close scrutiny, is found to vary from a deep neutral gray to blackish-brown. The color is uniform over the whole dorsal surface, but becomes on the belly and under-parts slightly lighter and more grayish. About the groins and the axillæ it is dull whitish and quite devoid of dark pigment. Both sexes are quite alike in color. The calves are usually deep neutral gray and usually a shade lighter than their parents. The body is absolutely hairless with the exception of the tips of the ears, the tip of the tail, and the eyebrows, which parts are clothed by a fringe of black hair. The tail is furnished along the two edges of its compressed tip by a crest of hair which projects stiffly out in line with the compressed surface, the two crests meeting at the tip but not forming a tuft distinct from the lateral crests. The hair has a length of from 4 to 6 inches and covers usually merely the terminal 5 inches of the tail. The hair

covering of the ears is much shorter than that of the tail, being 1½ inches in length and confined to the terminal third on the extreme edge of the ear-conch. The eyebrows are armed by a few stiff black hairs, but they are quite inconspicuous in such a colossal animal. This scanty hair covering is black except occasionally at the tips where it fades to brownish. The skin is quite smooth, the only definite folds being a transverse one on the foreleg above the knee and another across the nape immediately behind the ears. This latter fold, however, disappears when the head is lowered in feeding. Besides these large folds, the sides of the body are streaked by narrow, rib-like folds, a peculiarity not found on other rhinoceroses. These folds, however, are quite independent of the ribs, although they show a similar arrangement and direction. The calves are marked by these peculiar rib-like folds quite as distinctly as the adults.

The black rhinoceros is very little inferior in size to either the white or the single-horned Indian species, but is somewhat different in body shape from both. From the white it may be distinguished, aside from the shorter head, by its slightly longer body and the absence of the fleshy hump on the nape. The great Indian rhinoceros is at once distinguishable from it by its folded skin, which has the appearance of plates of armor, and by its shorter legs. The largest specimen in bulk of body in the National Museum is an old male from the Loita Plains, British East Africa, shot by Colonel Roosevelt. This one measured, in the flesh: 12 feet 3 inches in length of head and body, measured along the contour of the back; tail, 30 inches; hind foot, from the hock to the tip of the middle hoof, 17½ inches; ear length from notch, 9¼ inches; standing height at the withers, 4 feet 9 inches. The greatest length of the skull of this specimen is 23½ inches, measured from the tip of the nasal boss to the end of the occipital crests. The largest female is also a specimen from the Loita Plains shot by Colonel Roosevelt. She is but little less in size than the male and exceeded him in the height dimension; but this superiority in height is doubtless due to some error in taking the measurement rather than to an actual difference, as the skull and length of the specimen are both less

BLACK RHINOCEROS, FEMALE, SEVEN YEARS OLD
From Mwanza, German East Africa
In the New York Zoological Park

NILE WHITE RHINOCEROS, FEMALE AND YOUNG
Rhino Camp near Wadelai
From a photograph by Kermit Roosevelt

LIVING SPECIMENS OF AFRICAN RHINOCEROSES

than those of the male. This female measured: length of head and body along contour, 11 feet 3 inches; tail, 26½ inches; hind foot, 17 inches; ear, 8½ inches; height at withers, 5 feet 1 inch. The greatest length of the skull is 23 inches, which is but half an inch less than the male. Many of the old adults approach these dimensions very closely, and show surprisingly little variation in size considering their great bulk. The skulls of fully adult animals from British East Africa range in greatest length from 21½ inches to 23½ inches. The female skulls may be distinguished from the male by their lesser width across the back or occipital part. To this portion of the skull are attached the great muscles which move the head and make the horns effective in fighting, and it is no doubt this latter function which has carried the development of the occipital part of the skull in the male beyond that of the female. The nasal boss or rounded tip of the nasal bones upon which the front horn rests exhibits no differences in the two sexes such as we find in the white species, or rather genus. In conformity with this similarity in nasal bones in the two sexes we find the horns indistinguishable in size of base. Although the female does not carry a front horn, having a smaller base, she usually carries the longer and more slender horns. The front and rear horns vary greatly, however, in respect to one another. The typical condition is a front horn three or four times the length of the rear horn, rounded in outline, tapering gradually to a sharp point, and curving backward in a wide arc. From such horns as these there is every intermediate condition of relative length to the keitloa variety in which the rear horn equals or exceeds the front one in size. The usual length of the front horn is approximately 16 inches, but the record horns exceed this dimension greatly. The longest specimen in the National Museum is one having a length of 29 inches, shot by Kermit Roosevelt near Meru, a government station situated on the northeast slope of Mount Kenia. The record horn for Africa, recorded by Rowland Ward, is one with a length of 53½ inches, from East Africa, now in the possession of Doctor C. H. Osman. The second longest is one of 47 inches in length belonging to the well-known district commissioner of British East Africa, Doctor S. L. Hinde. We have examined at

the National Museum some thirty specimens of skins and skulls from the Loita, Kapiti, and Athi Plains, the northern slopes of Mount Kenia and Taveta on the southwest flank of Kilimanjaro in British East Africa; from Gondokoro, Uganda; and Mashonaland, Southern Rhodesia. Other specimens examined at the British Museum have come from northern Abyssinia, British East Africa, and Mashonaland.

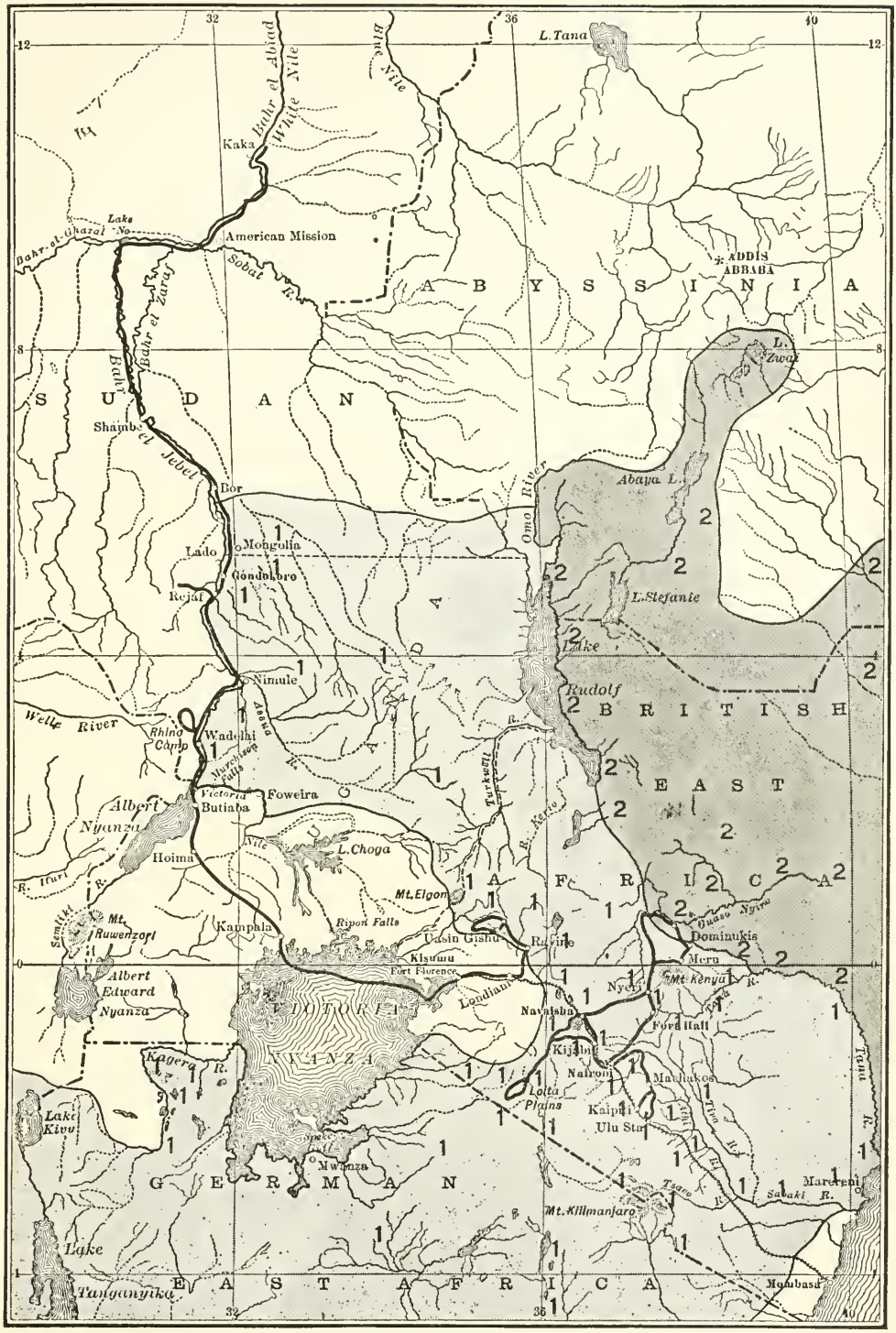
Somali Black Rhinoceros

Diceros bicornis somaliensis

Native Names: Somali, *wiyil;* Galla, *wartses.*
Diceros bicornis somaliensis Potocki, 1900, Sport in Somaliland, p. 82.

Range.—From the desert nyika zone of the northern Guaso Nyiro River and the north bank of the Tana River northward throughout the Lake Rudolf region to the Rift Valley of southern Abyssinia; east as far as western Somaliland and west as far as the east shore of Lake Rudolf.

Count Potocki has unwittingly become the authority for the name of the small race of the black rhinoceros inhabiting western Somaliland and the desert south of it. In his account of his hunting experiences in Somaliland, as narrated in "Sport in Somaliland," he mentions the rhinoceros of Somaliland, giving its scientific name as *Rhinoceros bicornis somaliensis*, and states that it does not differ from the rhinoceros of central Africa, but that specimens first obtained by Captain Swayne some years previously in Somaliland are said to differ, and he therefore apparently applies the name *somaliensis* under the assumption that this is the name by which it is already known. Count Teleki was the first sportsman to call attention to this race, which he pointed out in Von Höhnel's narrative of his discovery of Lake Rudolf. He refers to it as a smaller race than that inhabiting the highland country of East Africa, and records meeting with it first a short way south of Lake Rudolf and thence northward along the east shore of the lake to its extreme northern end. In distribution it coincides in a general way with that of the reticulated giraffe, Grévy zebra, and desert wart-hog. Lydekker has recently given a short account of this race in the Proceedings of the Zoological Society of London for 1911.



MAP 36—DISTRIBUTION OF THE RACES OF THE BLACK RHINOCEROS

1 *Diceros bicornis bicornis* 2 *Diceros bicornis somaliensis*

The Somali race of the black rhinoceros differs chiefly by being smaller than the typical form of British East Africa and the region south of it. The skull shows a flatter outline, the occipital crest being much less elevated than in the larger race. The depth of this dorsal concavity varies from 1¾ inches to 2¼ inches and averages a half inch less than specimens from the highlands of British East Africa. The body coloration is also slightly lighter, being neutral gray, and the ears have a shorter fringe of hair at their tips. Two specimens are in the National Museum, shot by Paul J. Rainey on the low desert plains in the vicinity of the Northern Guaso Nyiro. The skins of these two specimens are neutral gray and distinguishable by their lighter color and shorter growth of hair on the ear tips from specimens from the Loita Plains of British East Africa. Both of these specimens are females. The older and more typical one showed the following measurements in the flesh: head and body, 9 feet 8 inches; tail, 26 inches; hind foot, 17 inches; ear, 7½ inches. The skull has a length of 21¼ inches. A very old skull from Longaya Spring, with the teeth worn down almost to the gums, has a length of 20¾ inches, which is the average length for the race. The horns do not differ in shape or relative size from those of the typical race. The length of the front one in the specimen of which the flesh measurements have been given was 28 inches, while another one has a horn length of 22 inches, but these are both exceptionally long-horned specimens, and were the longest seen among some thirty or forty observed in the field. The Somaliland record given by Ward is 29½ inches. Besides the specimens examined at the National Museum, from the lower course of the Northern Guaso Nyiro and the region north of it toward Mount Marsabit, specimens from Somaliland have been examined in the British Museum and in Powell-Cotton's collection at Quex Park.

CHAPTER XXI

WHITE OR SQUARE-MOUTHED RHINOCEROS

Ceratotherium

Ceratotherium Gray, 1867, Proc. Zool. Soc., p. 1027; type *Rhinoceros simus*.

The white rhinoceros, like the black, represents a distinct type of which it is the sole living member. In fact, it is the most highly specialized form living. Its extreme specialization is brought about by the lengthening of the skull until it has become remarkably dolichocephalic or long-headed. The teeth are quite as specialized as its skull, and in some respects parallel those of horses. Like the horses, the crowns have become very long or hypsodont, and the cement layer has grown in thickness until it forms an important part of the grinding surface of the teeth. The teeth are no longer composed of loops which are separated by deep valleys and are open on the inside, but the loops have united and enclose the cement layer as islands or fossettes in the tooth. The crown is perfectly flat and shows a complicated pattern of alternating folds of enamel, dentine, and cement. This tooth specialization has been brought about by the grass diet, the lengthening of the crowns and their increased surface being necessary in order to masticate the tough grass stems which form the chief part of their food. The dental apparatus of the other living species of rhinoceroses, which are chiefly browsing animals, consists of short-crowned teeth,

with a surface made up of ridges separated by open valleys. Such a tooth structure is capable of masticating the softer food of a browsing animal, but is less able to stand the wear which a grass diet would demand. The recently extinct woolly rhinoceros was in some respects like the white, being a long-headed, long-toothed form, but it had a very peculiar snout, the nasal bones curving downward and uniting with the premaxillary in a solid, bony mass. This sort of structure gave it a long ridge-like or compressed base to the front horn, which projected forward, owing to the downward curvature of the nasal bones upon which it rested. Some naturalists have suggested a close blood relationship between the woolly and the white, but they are really only remotely related. The white rhinoceros resembles its geographical associate, the black, in having two horns and lacking both incisor and canine teeth. The white rhinoceros is doubtless, like the black, a form which has had its origin on the continent on which it is still found. The only known member of the genus is the living white rhinoceros, of which two races are recognized, one, *simum*, in South Africa, occupying the territory from the Zambesi River southward, and the other, *cottoni*, widely separated in the upper Nile region.

Nile White Rhinoceros

Ceratotherium simum cottoni

Native Names: Aluru, *kenga;* Sudani, *khartyt;* Bongo, *basha;* Dyoor *umwoh.*
Rhinoceros simus cottoni Lydekker, 1908, Field (London), vol. III, p. 319.

Range.—West side of the Nile from the Arau River opposite Wadelai northward through the Lado Enclave, along the west bank as far as Shambe, and west across the Bahr-el-Ghazal drainage to the Dar Fertit country, but not known to extend beyond the Nile watershed.

The Nile race of the white rhinoceros is the only one which still exists in a wild state. The southern race at the present time is represented by some dozen living individuals which are strictly preserved on an estate in Zululand. These are the survivors of the immense numbers which formerly inhabited the country between the Zambesi and Orange Rivers. In the Nile Valley they are confined to the district west of the river and are of local distribution only. The southern limit is the Arau River, which enters the Nile opposite Wadelai. Here they occur abundantly in the vicinity of Rhino Camp and a few miles to the north of this spot. They are not again met with until we proceed some hundred miles northward to the stations of Lado and Kiro. The most northern record is one reported by Selous west of the Shambe. Far westward several hundred miles we have a further record by General Mahon of one shot in the Dar Fertit country near the headwaters of the Bahr-el-Ghazal drainage.

The distribution of this species is everywhere bounded by rivers, both in the south of Africa and in the Nile Valley. They are found most abundantly in the close proximity of the Nile but do not occur on the east bank. In South Africa a similar impassable boundary was formed for the species by the Zambesi River. They formerly occurred abundantly on the south bank, but were never known to occur on the north side. To the south the Orange River formed the southern boundary. The river boundaries illustrate forcibly the strong aversion these great quadrupeds have to crossing streams. This aversion must be due to their fear of drowning, for they are quite immune from attack by aquatic animals.

During historic times the white rhinoceros has not been known to inhabit the region lying between the north bank of the Zambesi and the Lado Enclave. This is a great stretch of country of some eleven hundred miles and is apparently well suited to the habits of the species under consideration. At what period the white rhinoceros disappeared from this intermediate territory is not known but it is doubtless quite recent, for the Nile race has developed but slight structural differences.

Explorers have reported the occurrence of white rhi-

noceroses in various parts of equatorial and central Africa outside of the ranges here designated. Such records have all been found to be due to mistaken identity or confusion with the black species. The best known of such instances are the references of Speke, Grant, and Stanley to white rhinoceroses in Karagwe, German East Africa. The first Nile specimen to reach Europe was a skull collected by Major A. St. H. Gibbons, near Lado Station in 1900. This specimen was sent to Mr. Oldfield Thomas of the British Museum for examination, and upon its identification credence was given to the records of occurrence in Karagwe by the early explorers. More recent investigation, however, has shown these earlier reports to be erroneous. The race was named by Lydekker several years after Major Gibbons's discovery from the evidence furnished by skulls collected by Major Powell-Cotton near the station of Lado. The differences detected by Lydekker, greater width of the nasal boss and its more forward projection, are sexual characters confined to the male and are of no racial value. The Nile race resembles very closely, in external appearance and size, the southern race which formerly inhabited the territory lying between the south bank of the Zambesi and the north bank of the Orange Rivers. It differs, however, by the possession of a flatter dorsal outline to the skull, owing to the lesser production of the occipital crests above the dorsal plane, and by the smaller size of the teeth. The measurements of skulls of the two races show them to be of practically the same bodily size. The largest known skull in bulk is one secured in the Lado Enclave by Kermit Roosevelt, but this one exceeds only slightly the largest preserved one from South Africa.

It has been said by first-rate observers that the square-mouthed rhinoceros is of exactly the same color as the hook-lipped rhinoceros. This did not seem to us to be the case when we saw the square-mouthed rhinos living; they seemed to be of a perceptibly lighter gray, which under certain conditions of sky-effect and sun-angle seemed very light indeed, although as dark as the ordinary rhino when

the sun was at another angle, or when the sky-effect was different. A comparison of the skins shows that there is a very real difference of color, the hook-lipped rhino being of such a dark gray that it can legitimately be called black, while the square-mouthed species is of a smoky gray, a gray which can readily look whitish in certain lights. The ordinary name is by no means so much of a misnomer as we had supposed. The square-mouthed animal is totally unlike the hook-lipped one, so much so that it undoubtedly ought to go in a different genus; the two are at least as distinct as the moose and the wapiti. According to our observations the square-mouthed rhino averaged considerably larger than the hook-lipped, but there was overlapping between the smaller individuals of the first and the exceptionally big ones of the second; and the same was true of the horns, which averaged longer in the square-mouthed.

African big-game animals offer many puzzling examples of discontinuous distribution, and none more so than the square-mouthed rhinoceros. It was first known from the region between the Orange and the Zambesi, where it abounded, but was practically exterminated in the late eighties, so that now only a few individuals are left in a game reserve. North of the Zambesi it is not found until the great Nyanza Lakes are passed. Indeed, until Major Gibbons discovered it on the left bank of the upper White Nile, it was believed to be confined to South Africa. Examination of the series of specimens we brought home shows that there is only the smallest distinction, hardly of subspecific value, between these two widely separated groups of white rhinos. According to what Mr. Selous writes it appears probable that all the rhinos west of the Nile belong

to the square-mouthed species, which is never found east of the river, in the domain of the hook-lipped species. It is an added singularity in the distribution of these African rhinos that in South Africa they should have abounded in the same localities, while in the north their ranges are sharply divided by the upper Nile.

Our observations of the square-mouthed rhino were made during the three or four weeks we spent at and near our camp in the Lado, about midway between Lake Albert Nyanza and Nimule. All told we must have seen about fifty individuals. Of course we molested none after obtaining the full series needed for the collection; the extreme rarity of the species in collections rendered it of much importance that the series should be full.

We found them rather more gregarious than the common kind. Once we found four, and once five, together; in the former case they were lying down, so that it was not a mere fortuitous gathering to graze. Ordinarily they were found singly, or a cow and calf—often two or three years old—together; or a bull might be with the cow and calf. They are purely grazers, grass-feeders, and live only where there are great plains covered with the dry African pasturage; but these plains are generally dotted with clumps of bushes, and with a scattered growth of scantily leaved thorn-trees, acacias. The country is crossed here and there by broad, smooth, well-trodden trails, made by the elephants with some help from the rhinos, and often travelled by other game. We found the rhinos going to water, either at the Nile or some pond, during the night. They would then feed slowly back into the dry wastes, their spoor through the tall grass or over the burnt places being readily followed by

NILE WHITE RHINOCEROS, MALE
Shot by Theodore Roosevelt, Rhino Camp, Lado Enclave
Mounted by J. L. Clark in the United States National Museum

BLACK RHINOCEROS
Shot by J. T. McCutcheon
Tana River near Fort Hall

NILE WHITE RHINOCEROS, FEMALE
Shot by Kermit Roosevelt at Lado Enclave
Longest horned specimen, 31 inches

BLACK RHINOCEROS, FEMALE
KEITLOA VARIETY
Shot by Theodore Roosevelt at Loita Plains

NILE WHITE RHINOCEROS, MALE
Shot by Theodore Roosevelt at Lado Enclave

THE BLACK AND THE WHITE AFRICAN RHINOCEROSES

expert trackers. About ten o'clock they lay down under some tree; occasionally standing motionless in the half-shade for an hour at a time. Usually we found them lying on their sides, but sometimes kneeling. When roused they sometimes jumped at once to their feet, and sometimes sat up on their haunches like a dog; once Kermit saw one that had been walking to and fro, trying to make out what he was, sit down in this position. About mid-afternoon they rose from sleep and began to feed, making their way toward the water after nightfall. They fed a good deal during the night also. They frequently rubbed their noses and horns against the big ant-hills, for what purpose we cannot say. In walking they held their heads very low, the huge, square muzzles almost sweeping the ground. They trotted, and, if alarmed, galloped at some speed.

They were slow, dull, stupid beasts, rather mild-tempered. Once a badly wounded one made an attempt to charge Kermit, and on another occasion, after he had spent some time taking photographs of a cow and calf, he got so close that the cow finally charged, coming on at a fair pace, with the big, loose lips shaking from side to side. A big calf, over half-grown, also charged him, and he had to turn it by a shot in one cheek. None of the others of our party were charged, although we frequently watched the huge beasts close up, and then withdrew while they trotted to and fro. They were not as nervous and irritable as the black rhinos, and their eyes were even duller. Once having spent some time watching a cow and her big calf feeding, as we stood by a tree thirty yards off, they finally suspected our presence and stopped to look at us. We withdrew for forty yards or so, not wishing to have them charge and

force us to shoot in self-defence. Then we found the skull of one of their dead kinsfolk; one of the party stopped to pick it up and give it to one of the porters. We were talking and laughing; and all the time the two rhinos, their ears cocked forward, looked toward us with solemn bewilderment. So off we strode, and left them still standing, foolish and puzzled, among the sparse and withered trees, in the dry landscape.

If they got our wind the rhinos usually made off at once; but if they merely saw us they would stare at us and move to and fro, their ears up and perhaps their tails cocked, with dull curiosity. We frequently found cow-herons with them, and once a party of black-legged egrets. The herons perched on their heads and backs with entire indifference, and the result was that the rhinos generally looked as if they had been splashed with whitewash. Once, while walking through rather tall grass, we saw some white objects moving rapidly off in single file through the grass tops; and it took a second glance before we realized that they were white herons perched on the back of a rhino bull.

We have never known of a white rhino attacking man or beast in wantonness; but one of the few white rhinos on the South African game reserve, a bull, was charged, and killed, by a stab behind the shoulder, by a solitary bull elephant, a big tusker, which was also on the reserve.

The white rhino has been termed a slow breeder. Of course such a huge animal cannot breed like a guinea-pig. But our experience goes to show that it is for its size really a rather rapid breeder, that the cows breed before they are fully adult, and that they breed again before the calf they already have has left them. Two of the cows which we

found accompanied by calves had not yet shed all their milk teeth; and one cow, accompanied by a good-sized calf, was nearly on the point of giving birth to another.

The white or square-mouthed rhinoceros is a long-headed, tall-bodied animal with a flattened or truncate nose and a wide, square mouth. The excessively long head distinguishes this species at once from all other living forms. The ears are much longer and the feet larger than in the black rhinoceros. One of the peculiarities of this species is the prominent, rounded, fleshy hump upon the nape of the neck just forward of the withers. This hump is purely a muscular structure and receives no support from the dorsal processes of the cervical vertebræ. With the exception of three short folds the skin is smooth and lacks even such shallow markings as the rib furrows which are so characteristic of the black rhinoceros. The best marked of these folds, and the only one which is permanent, is a transverse fold on the foreleg encircling the limb just above the elbow. When the head is held level with the back a prominent transverse fold is formed on the nape just behind the ears. This fold disappears when the head is lowered in feeding and another longer transverse one is formed on the throat. The young at birth do not differ from the adults in color or skin structure and but slightly in proportions. The changes which take place with age are chiefly the growth of the horns and the lengthening of the head.

In size this species exceeds but slightly the big Indian single-horned species and but little the black African species. Measurements of the length and height of the Indian species given by Lydekker * are scarcely inferior to authentic dimensions of the largest South African specimens. Measurements of mounted skeletons of these two species show the Indian very little less in size. The black rhinoceros of East Africa stands several inches lower and measures less in length of head. The superiority in size of the white rhinoceros over the other living species has been greatly exaggerated. The utmost that can be said is that there is a slight average superiority.

* "Great and Small Game of India, Burma and Tibet."

In size the sexes are very similar, the male exceeding the female but little. The only appreciable secondary sexual characters are found in the size of the horn bases, the nasal bones which support them, and the general massiveness of the skull. The base of the front horn in the male is always greater than in the female, this dimension showing no relationship to the length of the structure. The width of the nasal boss which supports the front horn is correspondingly greater in the male. Male skulls are usually actually wider than those of females and are always relatively so as well as being longer. So marked are these sexual characters in the skulls that they can be sexed with a fair amount of certainty.

The species is normally two-horned, the front horn greatly exceeding the rear one in size. The front horn is situated on a prominent bony boss at the tip of the nasal bones and is immediately followed by the rear horn which is much compressed laterally and placed on the suture between the nasal and frontal bones. The front horn is squared in front where it partakes of the shape of the snout, and is normally curved backward as in the black rhinoceros. The usual length of this horn is two feet although occasional specimens attain a length of five feet. The record horn for the South African race is sixty-two and one-half inches. Such enlarged horns are attained only by the females in which they project forward in advance of the snout. The rear horn is usually low, sharply conical, and considerably compressed. It seldom exceeds more than a few inches in height and is occasionally wanting. The rear horn never approaches the front one in size as in the keitloa variety of the black rhinoceros in which the two horns are equal in size. The rear horn is so small that it is obviously disappearing, the species showing a marked tendency to become single-horned; but actual single-horned specimens are rare.

The only parts of the body which show a growth of hair are the terminal margins of the ears and the apical one-fourth of the tail. The hair of the ears is quite soft and an inch or so in length. The hair covering of the tail is stiff and bristly, and confined to a streak along both edges of the flattened tip. In the two male skins the hair covering

TABLE OF FLESH MEASUREMENTS OF SPECIMENS COLLECTED DURING JANUARY, 1910, AT RHINO CAMP, LADO ENCLAVE, BY THE SMITHSONIAN AFRICAN EXPEDITION UNDER THE DIRECTION OF COLONEL ROOSEVELT.

Sex and Age	Length of Head and Body	Length of Tail	Standing Height at the Withers	Length of Front Horn	Diameter of Base of Front Horn	Nature of Specimen	Collector
	Ft. in.	Ft. in.	Ft. in.	Inches	Inches		
Male adult . .	11 9	2 5	5 8	24¼	7⅞	Skin and skeleton	Theodore Roosevelt
Male adult . .	11 5	2 6	5 3	14¾	7	Skin and skeleton	Kermit Roosevelt
Female adult.	11 3	2 3	4 11½	23¼	6⅞	Skin and skeleton	Theodore Roosevelt
Female old . .	11 1	2 4	5 3	23¾	7	Skin and skeleton	Kermit Roosevelt
Female adult.	10 2	2 4	5 2	13¼	6¾	Head skin and skull	Theodore Roosevelt
Female adult.	. . . .	. . . .	. . . .	29	6¾	Head skin and skull	Kermit Roosevelt

these parts is glossy black and quite profuse, but in the female skins the covering is much thinner and decidedly brownish in color. The young at birth are no more hairy than the adults, possessing only the ear and tail fringes of coarse hair.

The skins of the white rhinoceroses cannot under the most lenient consideration be classed as white. They are, however, distinctly lighter than those of the black species, and may on this account be allowed to retain their popular designation of white. The blackness seen in the mounted specimens is due to pigment put on by the taxidermists, and such specimens do not represent the natural color of the animal. Their true color is smoke-gray, as defined by Ridgway, a color conspicuously lighter than the dark clove-brown of their geographical ally, *Diceros bicornis*. The four adult skins from the Lado Enclave show some variation, the color ranging from smoke-gray to broccoli-brown. The two male skins are lighter than the female but the color differences are not constant, the two female skins varying more in color from each other than they do from the male skins.

Measurements of an adult male in the flesh shot by Colonel Roosevelt at Rhino Camp, Lado Enclave, are: length of head and body along contour, 11 feet 9 inches; length of tail to end of vertebræ, 2 feet 5 inches; standing height at shoulders, 5 feet 8 inches; length of ear, 11 inches; length of hind foot (hock to tip of middle hoof), 1 foot 7 inches. Skull of the largest male: greatest length, 2 feet 9 inches; zygomatic width, 1 foot 3⅛ inches; length of upper tooth row, 10 inches; projection of occipital crests above dorsal plane of skull, 1¾ inches. The largest-horned specimen in the National Museum is a female shot by Kermit Roosevelt. This horn measures 29½ inches in length and exhibits the peculiar forward pitch which is not infrequently shown by specimens from South Africa. The pitch forward in this case is extreme, the point coming in contact with the ground in feeding, so that the point is worn flat on its outer face. No other Lado horn showing this peculiarity of curvature has been seen. The longest horn in Major Powell-Cotton's collection is 36 inches in length, and in shape curves backward in the normal way. This

MAP 37—DISTRIBUTION OF THE RACES OF THE WHITE RHINOCEROS

1 *Ceratotherium simum simum* 2 *Ceratotherium simum cottoni*

is also from a female specimen and is the longest one which has been examined. Ward records a horn 40¼ inches in length secured in the Bahr el Ghazal by Captain F. G. Poole.

The specimens examined consist of the series collected by the Smithsonian African expedition under the direction of Colonel Roosevelt at Rhino Camp, Lado Enclave. The precise geographical position of this spot is latitude 2° 55′ north, on the west bank of the Nile, some fifteen miles north of the station of Wadelai. This material consists of fourteen specimens: the complete skins and skeletons of two adult males, two adult females, one calf, and one mature fœtus; the head skins and skulls of three adult females; the skull of a male, and four weathered skulls found on the veldt, two of which are undoubted males and two females. Besides this material in the National Museum the writers have examined specimens from South Africa in the British, Paris, and Hamburg Museums as well as Nile specimens in the Congo Museum at Brussels, and a large series in the private museum of Major Powell-Cotton at Quex Park, England.