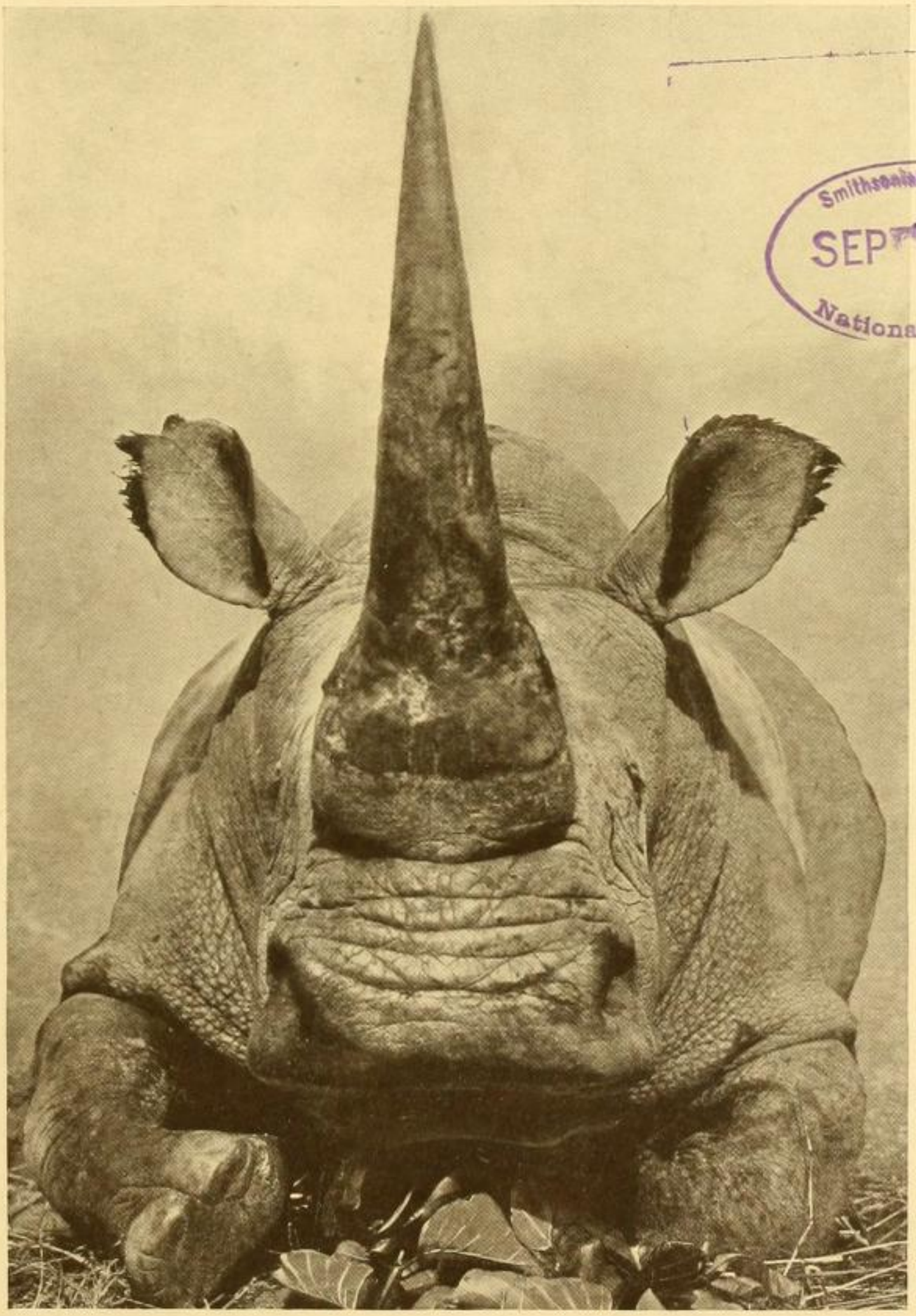
ZOOLOGICAL SOCIETY BULLETIN

WHITE RHINOCEROS NUMBER



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No. 4

JULY,
1920

THE WHITE RHINOCEROS OF THE BELGIAN CONGO

By HERBERT LANG

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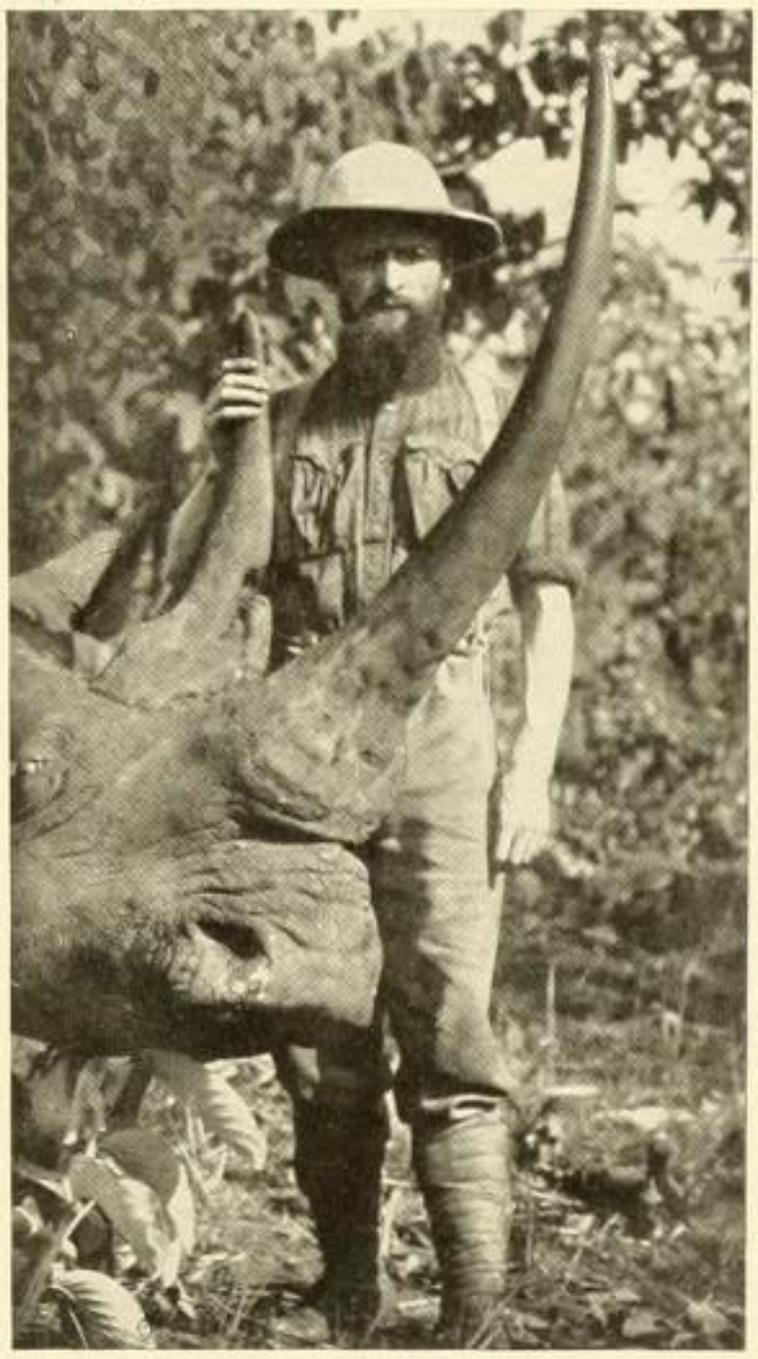
OF THE
BELGIAN CONGO

TEXT AND ILLUSTRATIONS
By HERBERT LANG



IN THE FIELD

The author, with one of the prizes collected by the American Museum of Natural History Congo-Expedition (1909–1915), of which he was the leader.

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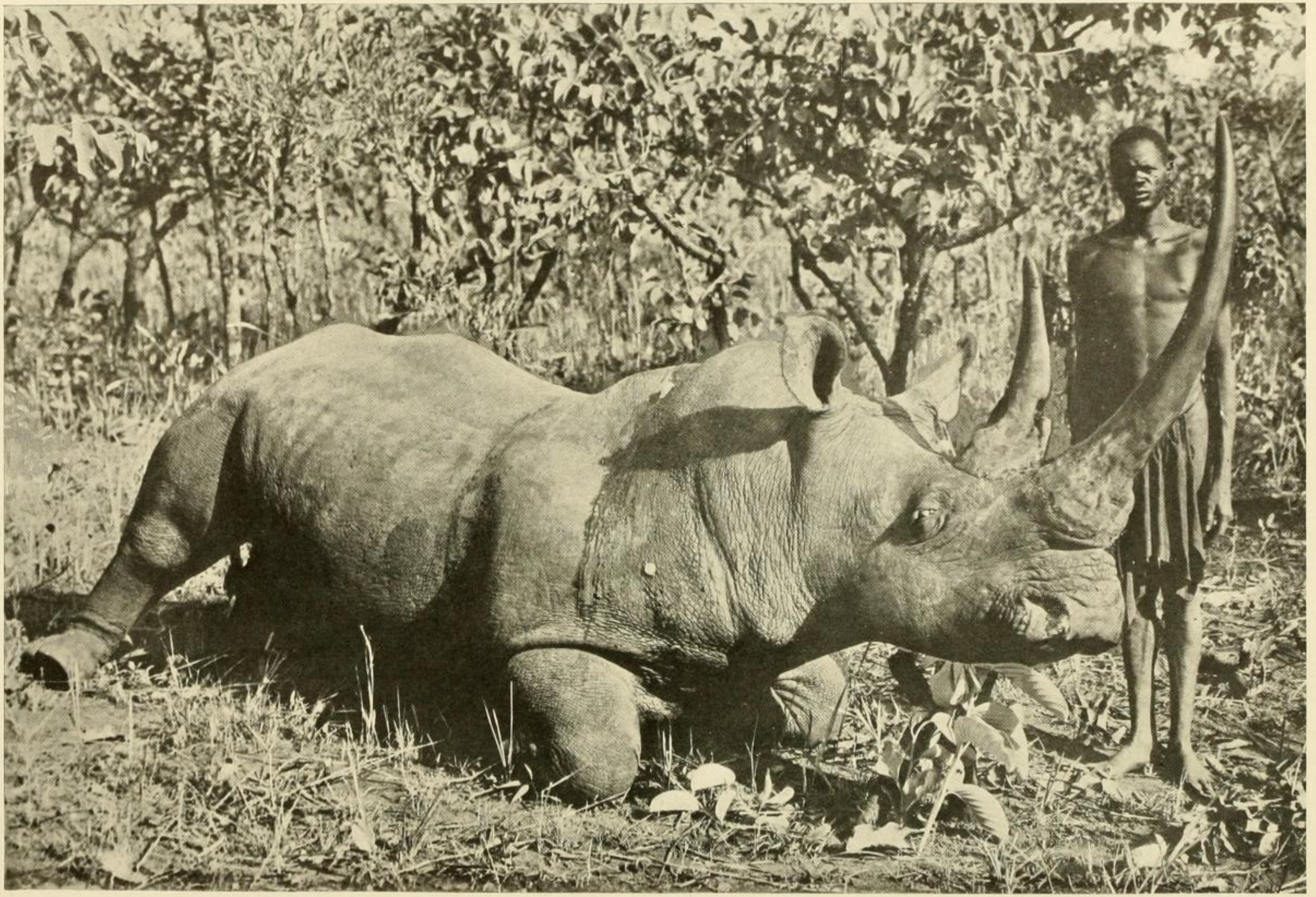

RECORD BULL WHITE RHINOCEROS FROM THE UELE DISTRICT, BELGIAN CONGO

The forty-two inch front horn, and the unusually long rear one, together weigh nearly forty pounds. They act as a fender in thrusting aside obstructions in the jungle. From snout to tip of tail the animal measured fifteen feet five inches. The standing height at the shoulder was five feet eight inches. It is now mounted and on exhibition in the American Museum of Natural History. No white rhinoceros has yet been exhibited alive.

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VOLUME XXIII JULY, 1920 NUMBER 4

THE WHITE RHINOCEROS OF THE BELGIAN CONGO*

By HERBERT LANG

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Illustrations from Photographs by the Author

LATE in May, 1909, at the Foreign Office in Brussels, diplomatic attention, strange to say, was focused upon the subject of white rhinoceroses. The pending question involved the conditions under which the Congo Expedition, sent by the American Museum of Natural History to the Belgian Congo could gather material for a habitat group of these rare and legally protected animals. The Colonial Administration had pledged itself not to grant any one the privilege of disturbing the only herd of white rhinoceroses then officially known, until Colonel Roosevelt had completed his visit to the eastern border of Belgian territory.

His Excellency the Minister of Colonies was then in Africa to second the efforts of the present King Albert, who as heir to the throne was anxious to acquire first-hand information about the great Central African domain. Secretary General H. Droogmans and Director General A. Kervyn, in charge of such matters, frankly informed us of the queer turn of circumstances. Could we perhaps suggest a satisfactory solution?

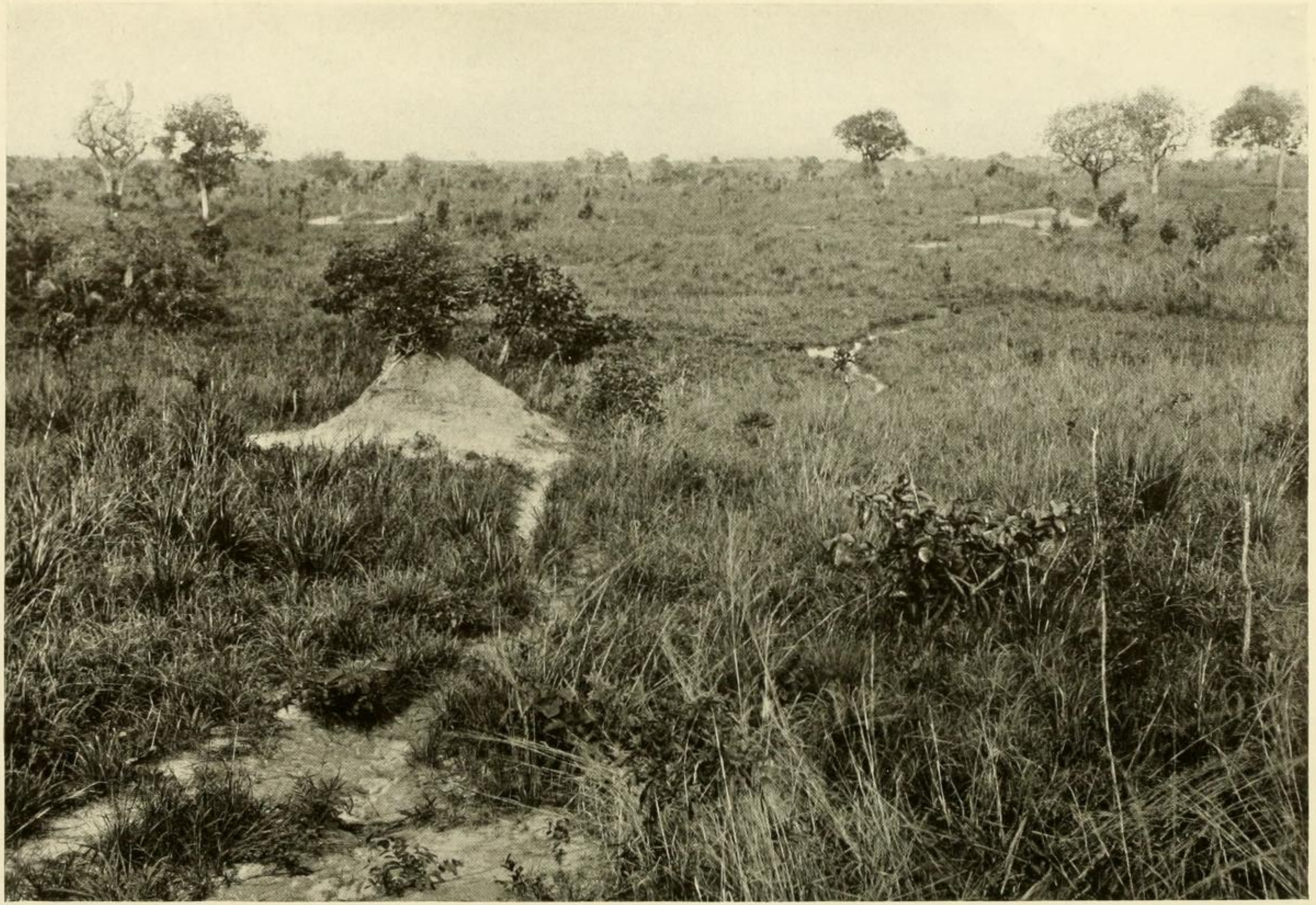
Foundation of the African Exploration

Fortunately Mr. James P. Chapin and the writer were able to inform our hosts that Professor Henry Fairfield Osborn, President of the American Museum, and Colonel Roosevelt already had arranged that the two American expeditions might unite their efforts to realize more easily the great project of presenting to visitors of the New York Museum a realistic bit of the greatness and fascination of the African jungles. This discussion about white rhinoceroses also suggested further cooperation for the benefit of the Colonial Museum in Tervueren, Belgium, and the final solution of the difficulty presently afforded an opportunity for hearty congratulations.

Our progress from Banana, at the mouth of the Congo River, across the western half of Africa consumed a great deal of time and the gathering of material for a habitat group of the rare okapi so delayed the Congo Expedition that we had to forego the pleasure of meeting Colonel Roosevelt in the haunts of the white rhinoceros. When we arrived in the northern Uele district we found, contrary to all rumors, that the far-famed beasts were fairly numerous. We were spared the trouble of asking the Sirdar of Egypt for the privilege of proceeding to the Lado Enclave, which, after the demise of King Leopold, had reverted to the British crown. Furthermore, on account of sleeping sickness this territory had been closed to caravan traffic, and access to the Nile was impossible without special permission. Fortunately at Niangara the Honorable Charles Smets, who knew more than any one else about the white rhinoceroses in that region, kindly offered his expert advice, and later his devoted friendship contributed much to the success of the Congo Expedition.

Zoological Status of the White Rhinoceros

Formerly the white or square-lipped rhinoceros *(Ceratotherium simum simum)* was considered common only in South Africa. In years gone by thousands were wantonly slaughtered there, and today



PLAY-GROUNDS AND FEEDING GROUNDS OF THE WHITE RHINOCEROS

Vast stretches of rolling grassland dotted with scattered bushes and trees are their ideal haunts. In April, the vegetation is low, and then many trails are clearly visible. The bare, smooth hillocks in the picture are termite structures, against which the rhinoceroses delight to rub themselves after their frequent mud baths.

but a few mounted specimens, skeletons, and skulls are all that is preserved in the museums of the world. A very few still are alive in the Umfolosi reserve in Zululand. These being supposedly the last of their race, considerable surprise was aroused by the discovery of a northern form *(Ceratotherium simum cottoni)* by Major Gibbons when he stopped in 1900 at Lado, just west of the Nile. Since then Powell-Cotton, Solvay, Winston Churchill, Selous, de la Kethulle, Colonel Roosevelt, and the Congo Expedition (1909-1915) have established the fact of their relatively extended northern range. My companion, Mr. James P. Chapin, and I had the privilege of studying them thoroughly during our exploration in the northeastern Uele, throughout a period of over two years, and the writer's previous experience with black or hook-lipped rhinoceroses *(Diceros bicornis)* during the Tjader East African Expedition also proved valuable by way of comparison.

Habitat

The habitat of the white rhinoceros in the north is essentially similar in environmental and climatic conditions to that in the south. Though situated only a few degrees north of the moist equatorial regions, various factors, especially the proximity of the most extensive desert in the world, have helped to stamp upon it all the characteristic features of the African savannah, well scattered with scrub. As the haunts of the rare okapi are restricted to the northeastern Rain Forest, so the habitat of these white rhinoceros lies in the northeastern savannah of the Belgian Congo, and beyond it to the Nile.

In general the country is fairly arid, especially the large expanses of higher-lying brush country, and the rolling savannah, where one seldom can find a waterhole. In many places granular, brownish-red limonite is so predominant as to form great boulder fields, in some features resembling those of volcanic origin. In lower-lying tracts, however, swamps are numerous, as may be expected in a territory representing a portion of the Congo-Nile divide. The most typical swamps are overgrown with papyrus twelve feet high, and at a distance look like an uninterrupted stretch of grass country. The deepest portions are thus brought to an even level with the surrounding areas. Usually some clear water runs through the dense mass of stalks, but below the dirty scum-laden surface it is often lost in a mere brownish fluid. Near the more open places, where the crossings of rhinoceroses, elephants, buffaloes, and even giraffes are found, tropical luxuriance runs riot, marantaceous plants of a glossy dark green cover small tracts; blue, yellow, and whitish flowers of water-lilies being common. Clusters of graceful *Phoenix* palms there tower above all other vegetation.

To the north and northeast some of the swamps forming the sources of the affluents of the Congo and the Nile are separated by only low undulations, in some places no more than fifteen feet wide. In years of extra heavy rainfall, the two river systems may thus be connected, especially as here the rise of the waters is often surprisingly rapid. As a result there are a large number of species of fishes common to both watercourses.

The Uele District

In the Uele district, typical mountains are unknown and even the highest elevations, which reach an altitude of 3000 feet above sea-level, look rather like rounded hills. Many of these are merely enormous granite boulders or grass-covered ridges. About Aba, especially to the south, such hills are fairly barren, and from one of the highest a panorama including seventy others may be enjoyed. Some of them, however, are covered with vegetation, most often in the ravines, and even one of the greatest, Gaima, is crowned with trees.

Seasons and Vegetation

In the northeastern Uele and southern Bahr-el-Ghazal we find the striking contrasts of dry and rainy seasons typical of savannah regions, with grass ten to fifteen feet in height, and low bushes and trees. The wet period starts towards April, with heavy rains from June to October, or further north to November. The terrific rains and the fury of the storms beat down the tall grass and entangle it still further. The vegetation becomes more impenetrable, the swamps are full of water, the brooks and rivers often impassable, and the highways few. The cutting blades of grass lacerate the natives' skin, and are a serious check to travel. Hunting is fraught with dangers, for the height of the jungle cuts off the view and one is exposed to unexpected encounters. The country now bears all the marks of devastation from the continued passage of the big game. Bushes and trees take on true autumnal colors and all that relieves the general monotonoy of the scene are a few groups of flowering bushes and plants.

Savannah Fires

With the early part of the dry season, stretch after stretch of the minor forms of vegetation in this immense area is slowly consumed by the crackling and roaring fires set everywhere by natives. Hundreds of kites, other birds of

ACROSS LUXURIANT SWAMPS

In these crossings, they habitually quench their thirst, cool their hide and wallow in the mud. Here, between the monotonous reaches of the savanna, graceful boskets of Phoenix palms tower above the tall sedges and sprays of violet flowers amidst a maze of spear-headed leaves. Often white, yellow and blue water-lilies emerge between their frilled pads, completing the tropical setting.

prey, even vultures, and bee-eaters, rollers, swallows, and swifts busily snap up, amidst clouds of smoke, the escaping insects, some of which are carried high by the currents of heated air. Right after the fires have passed, white-necked storks and marabous may be seen searching the blackened ground for the large grasshoppers, reptiles, and lesser animals that have been injured or killed.

During the conflagration game stands without fear in close proximity to fire, and in certain places may even walk across the fire line. With unexpected rapidity the tender grass commences to spring up and the bright green blankets attract the game, most of which again form herds, larger than at any other time.

As soon as the smoke-laden atmosphere clears and the burned particles carried by the wind cease to fall, trees and bushes show some green again. In a few weeks springtime seems to have arrived. Gorgeous blooms often grace the bushes and trees, and a delightful fragrance may fill the air. Scattered flowers appear, but fields washed in a single bright tone are unknown. Orchids emerging from the parched soil, or even from the ashes, with their delicate form and color, mostly white, violet, yellow and rose, are an agreeable surprise.

Best Time for Hunting

The season from January to June is the ideal hunting period, but success depends upon a thorough knowledge of the country. In the northeastern Uele district, game at all times is scarce as compared with its abundance in British East Africa. Some sections then are alive with natives, for with them it is the most propitious time for laying in their annual supplies of meat. They often make use of grass fires to drive their prey to certain places where companions with nets, spears, and arrows are ready to slaughter all they can.

Sometimes whole fields are covered with the heavier charred stalks that have been left standing by the flames. These obstruct the view and make hunting difficult. Many of the swamps are dry, and the river-beds nearly empty, forcing game to travel great distances in search of water. During the rainy season much of the savannah proper is traversed by sluggish rivers winding their way between low banks, as in newly dug channels. It seems strange that even then in spite of the proximity of water there is not the slightest trace of greater luxuriance in those sections, the typical scrubby vegetation leading down to the water's edge without change.

Neighbors of the White Rhinoceros

Occasionally widely different aspects are offered in other parts of this region, where wooded strips mark from afar the sites of swamps, or meandering watercourses. These forest galleries show many of the features characteristic of the equatorial Rain Forest, and strange contrasts are naturally unavoidable. Indeed, here one may listen to the calls of the chimpanzee as they mingle with the roaring of the lion, the howl of the hyena, and the yelping of the jackal. The serval and the leopard, the civet and prairie cat all find their living here. The sylvan red colobus, and the black-and-white guereza, so typical of these forested galleries, both jump noisily from tree to tree. The forest-loving red river-hog, and the wart-hog of the plains may wallow in the very swamps that elephants and square-lipped rhinoceroses have used a few days before, and the cane-rat *(Thryonomys)* cuts its runways through the high grass. The same termite hills may here be visited by the scaly ant-eater *(Manis)* and the aardvark *(Orycteropus)*, and without taking a step one may observe both the large forest squirrels *(Protoxerus)* and the fossorial ground squirrel *(Euxerus)* of the savannah.

Daily Habits

To paint a vivid picture of the northern white rhinoceroses in their leisure, frolics and unrest is no easy task, for the obscurity of night enshrouds their most active phases. One can no more hope to succeed in wresting life's secrets from these two-horned monsters during the short span of the blazing sun than to observe native customs during the long hours of the moon. In the heat of the day, rhinoceroses merely rest, wherever they may be, in open or dense thickets, in shade or scorching sun. In the early morning they may continue to wallow, or like nomads take delight in roving, or they may be seen while standing still to doze off the effects of late hours. When violently disturbed in their light slumbers they, like most other gigantic creatures, rush either to safety or attack. Most of their assailants unfortunately have greater interest in them when dead than alive, and refer to them either as cowards or heroes. These are the regions wherein distance counts for naught, and the eyes have to scan each minute sign in trails and tracks. From them alone one reads the facts supplied so seldom by face to face encounters.

BLACK OR HOOK-LIPPED RHINOCEROS

The triangular, prehensile process of the upper lip, responsible for the name "hook-lipped," helps this browser gather leaves and twigs. The anterior horn is roundish and usually longer than the posterior one, but both may vary considerably in form. In this case the tiny third horn between the usual pair is abnormal. Both photographs from a bull shot by the late Mr. Richard Tjader at Solai, during the first of his three expeditions to British East Africa. The right hand picture is reproduced by courtesy of D. Appleton and Company from Mr. Tjader's book "The Big Game of Africa," (New York, 1910.)

Color

The "white" rhinoceros, whose hide is naturally dark slate gray, belongs, like the elephant, hippopotamus and giraffe, to those groups of gigantic land mammals which flourished millions of years ago. At present it is impossible to state with any reasonable degree of precision which is the largest of the five species of rhinoceros still living in India, Malaysia and Africa. Huge dead mammals are so difficult to handle that accuracy in measurements, made in so many different ways, cannot be expected. When taken from mounted skins and skeletons they are liable to introduce even greater errors Unfortunately the natives' and sportsmen's hecatombs of these giants never have furnished to any museum a sufficient number of adult specimens by which to settle all questions of size. Perhaps the white rhinoceros surpasses in bulk the great Indian species, but we are not sure of it. The latter, like the lighter built Javan species, has only one horn, in contrast with the smaller, hairier, two-horned Sumatran, and the only other African species, the black rhinoceros.

The names "square-lipped," "square-nosed," and "square-mouthed" for the white rhinoceros are traceable to the broad and truncated snout, with wide-open nostrils. The term "hook-lipped" is equally applicable to the triangular, pointed and prehensile median process of the upper lip of the African black rhinoceros. Incidentally, this broad snout and heavy underlip are facial features that may, as in horses, express moods of great excitement, though two other signs help to announce this,—the tail held high or knotted in "pig-tail" fashion, and the cocked-up ears.

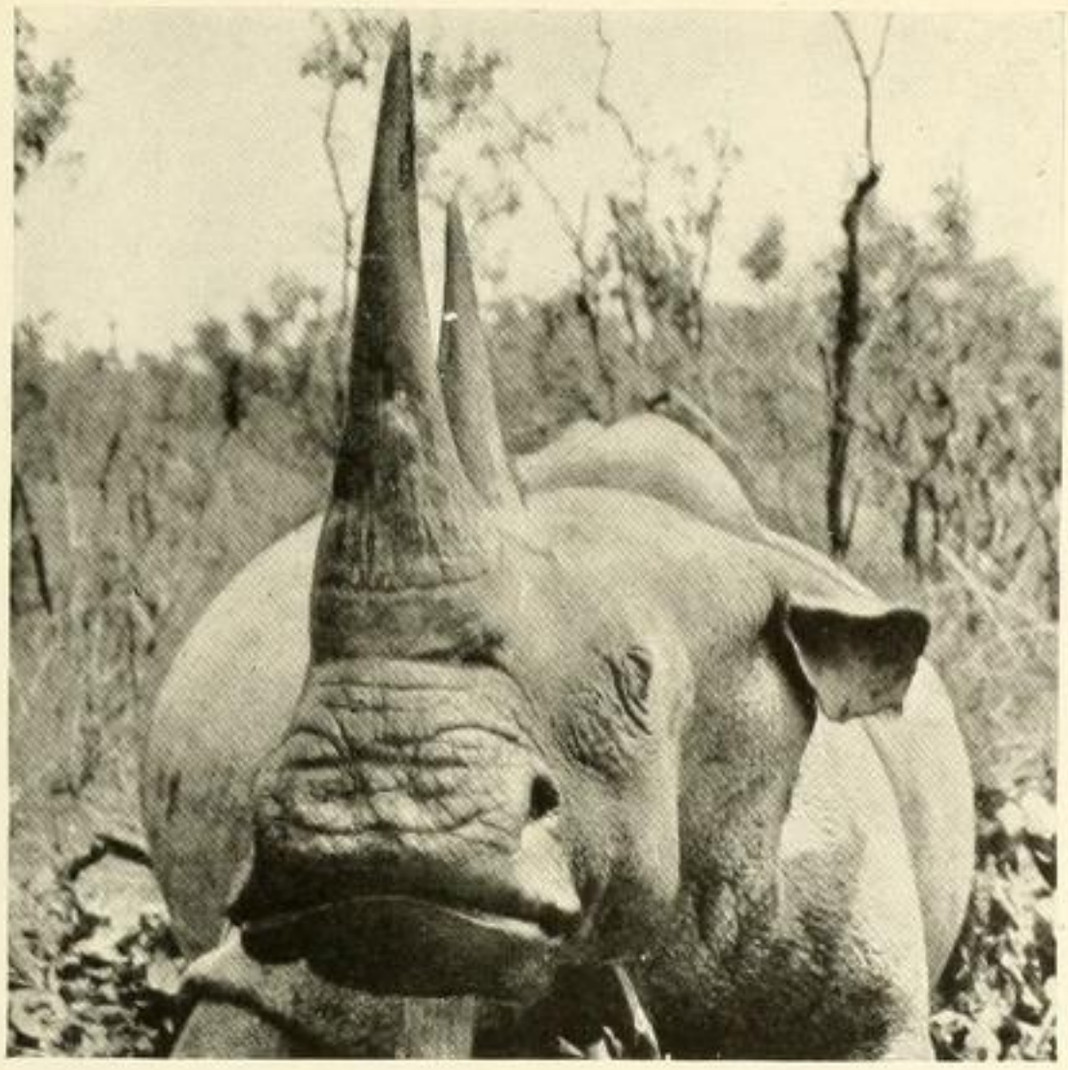
The South African Race

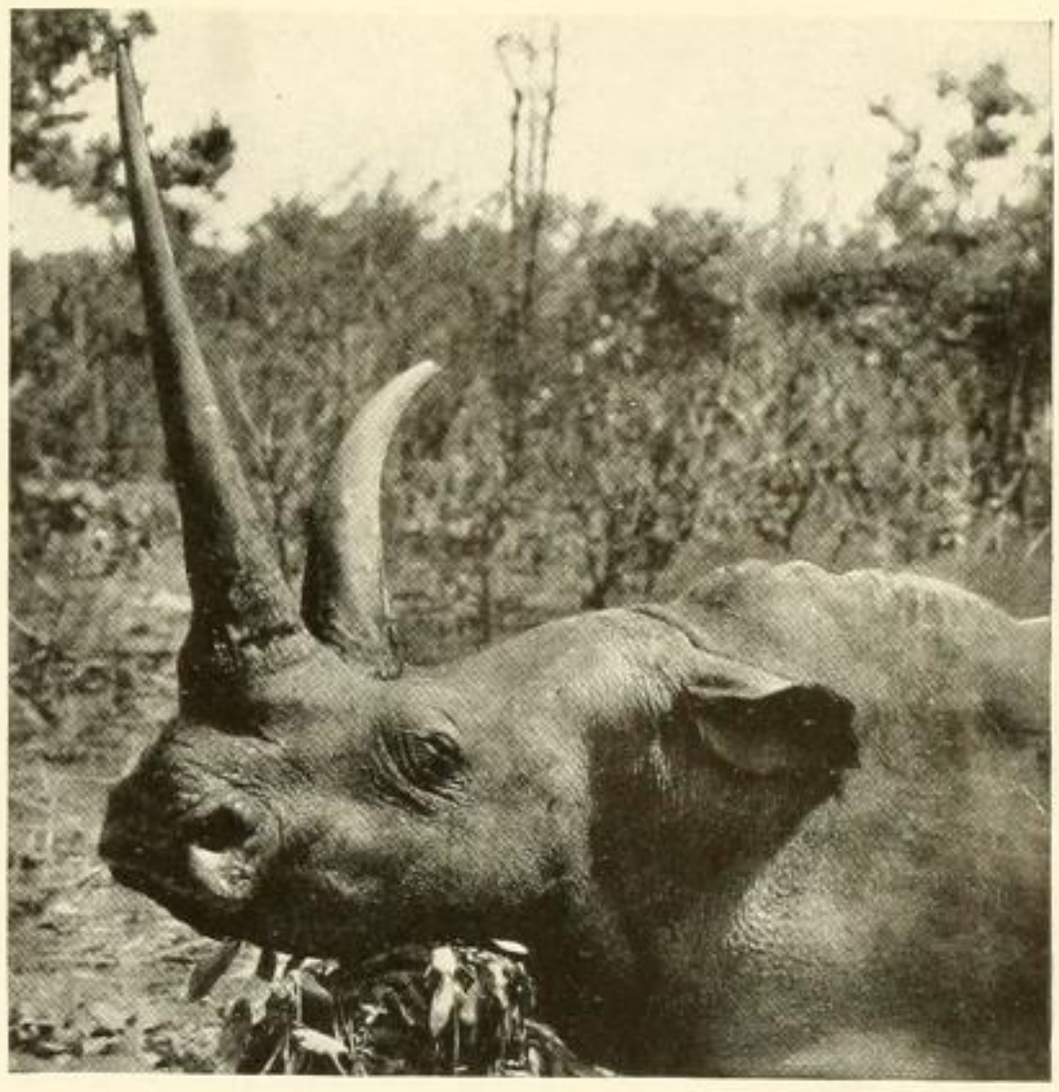
The subspecific differences between the South African and the Nile-Congo races of white rhinoceroses are slight. Heller* considers the great concavity in the dorsal outline of the skull of the southern form *(C. s. simum)* as the only valid difference. But even this character is subject to doubt, for the material collected by the Congo Expedition shows the same amount of individual variation that seems to be common among all large mammals. The white rhinoceros differs from the black in the following external characters: Greater average size; longer head; fleshy hump in front of shoulder; truncated snout; straight lips, the lower one with horny edge; relatively heavier horns, the anterior with squarish base and flattened front; bigger soles for the feet.

Bulk and Gait

The huge bulk of the white rhinoceros standing erect and alert, with its unwieldy head and cocked ears turned in the direction of danger, presents an impressive sight. The

* Smithson Misc. Coll., LXI, No. 1, 1913, pp. 1-77, Pls. I-XXXI.





WHITE OR SQUARE-LIPPED RHINOCEROS

The broad, square mouth and especially the horny edge of the lower lip, facilitates the cropping of grass, its only food. In the picture at the left, this ridge, usually covered by the bulky snout, may be distinctly seen. The head of this species is much longer than that of the common black rhinoceros. From contact with vegetation near the ground the anterior horn is worn off in front, and its base squarish. The variation in size and shape of horns is very extensive.

menacing horns suggest painful possibilities, and they would be formidable weapons of aggression were it not that the peaceful grazing habits of their owner have relegated them to an eminently practical use. In these regions of high grass, except during a few months after the annual grass fires, progress through the tangled mass of vegetation demands intense muscular exertion. The fending action of the horns, carried close to the ground, clears the way for the short, pillar-like front legs and barrel-shaped body as the animal slowly passes across country, or grazes with constantly nodding head. Imagine nearly forty pounds of horns on top of a long, wedge-like nose, swung about with astonishing ease, while tearing through the jungle. Quite naturally this abrading use accounts for their general smoothness. To this incidental friction, and not to a supposed special grinding action against stones or the ground, nor to digging, must be ascribed the flattening in front and the wear directly above the base of the anterior horn, as well as the posterior edge and often spatulate form of the rear horn.

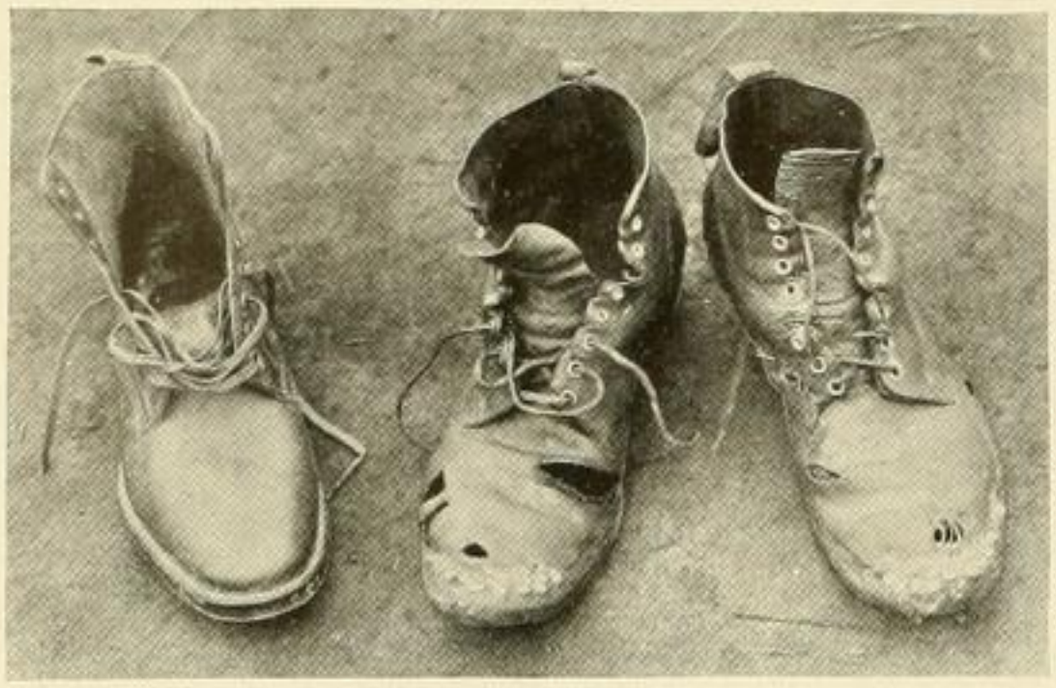
Physical Features

The factors giving the long, weighty head such remarkable facility of movement are the highly efficient ball and socket joint hinging the head to the neck and the enormous band of sinewy nuchal muscles extending from the rear of the skull to the high processes of the vertebral column. A huge mass of muscles on either side of this "rubber band" are responsible for the distinctive hump in front of the shoulder. At every sway of the head they exert an enormous pull on the upper corners of the skull, which perhaps has brought about its curious V-shaped dorsal outline in the rear.

Horns

There are always two horns, except in young calves, where the posterior one is merely a slight hump. Far from being set directly upon the skull they rest upon the heavy hide, which runs beneath them without interruption. After two days of decay they easily can be pulled off the skin, to which they are attached only by small fibres sunk into innumerable tiny pits, but if haste is necessary they can be severed at once with a knife. In adults there is a roughened, granular area upon the naso-frontal bones beneath each horn. The slightly thickened patch of skin between horn and bone certainly forms an ideal cushion to absorb the shock of heavy blows. No doubt this is also an important function of the hide, which in some places is about two inches thick. It is toughest on shoulder, belly, and other parts exposed to abrasion in passing through the jungle.

Under normal circumstances, the front horn is much the longer of the two. In contrast with the roundish base of the horn in the black species, that of the white rhinoceros is rather square. Individual variation in size and form



EFFECT OF THE RAZOR-LIKE EDGES OF GRASS

The author's shoes, before and after a nineteen days march through the haunts of the white rhinoceros. The tips, filed away by the grasses, were nailed down again with brass tacks, and the other holes were mended with wire. Imagine what such friction does to the horns of rhinoceroses fending their way through the cutting grass of the jungle.

is considerable. The heavier development of the nasal boss in males allows for relatively larger and heavier horns. The one in front may be perfectly straight, as in exceptional female specimens, or curved slightly forward, or bent so far backward as almost to describe a semicircle. With advancing age, the part immediately above the base is worn away gradually and the outstanding lower portion shows well their bristly makeup of vertical, strongly agglutinated hollow fibres.

The posterior horn is directly behind the other, and it may be at a little distance from it, as in young specimens. As a rule it is considerably shorter, roundish, or laterally compressed. Exceptionally fine horns are not dependent on great age, but are carried by individuals in the prime of life, those of very old specimens generally being inferior.

Charge of the White Rhinoceros

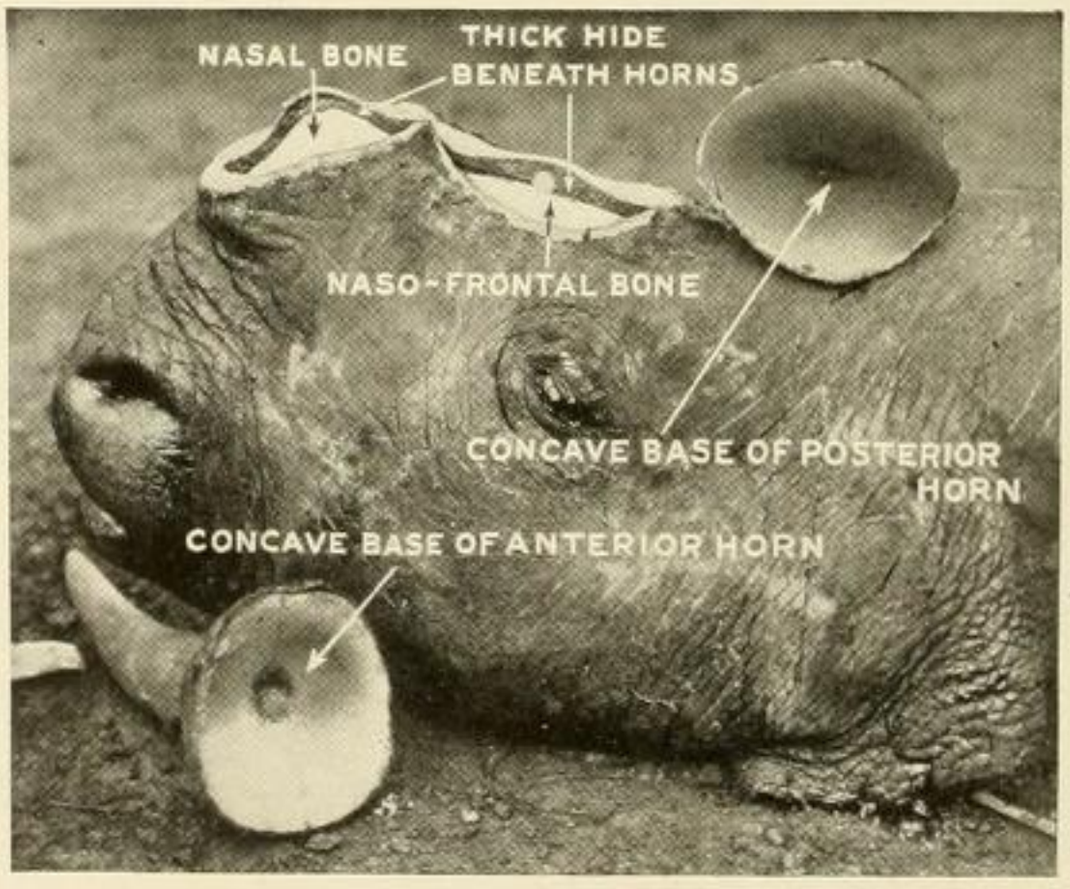
However seldom these rhinoceroses charge their living enemies, at times bushes, trees, and even boulders may receive the tremendous impact of their weight and violence. Often in such reckless plunges, instead of crushing an imaginary foe, they splinter their front horns. In the Uele district at least, this is not so rare an occurrence, for among sixty waiting at a post to be exported to Egypt, half a dozen had been injured in this manner. Of two that we obtained from our own freshly killed specimens, one anterior horn was a mere stub and the other only a little higher than the posterior horn. Those of younger animals are too short and solid to be broken; only the worn-off, slender horns of adults are subject to such damage. The splintered portion is gradually polished off, but the stumps left probably never change much in form.

Measurements

From South Africa a single remarkably slim front horn of sixty-two and one-half inches, and probably from a female, credited to Colonel W. Gordon Cumming, breaks all records for length. In open plains horns may grow uninjured, but they cannot escape the gradual wear from the razor-like blades of common grasses, which is the most probable way of accounting for their slenderness. Perhaps the density of the brush and roughness of the ground in the haunts of the white rhinoceros west of the Nile do not permit such excessively long-horn development. We were fortunate, however, in obtaining there the two largest complete specimens of white rhinoceros ever collected, the photographs of which are reproduced herewith for the first time. One, the bull, had a total length of fifteen feet five inches in a straight line from snout to tip of the tail, which itself measured thirty-two and one-half inches. His standing height at the shoulders was five feet eight inches, but at the nuchal hump, by raising the neck and pulling the forelimb eighteen inches more might have been added.

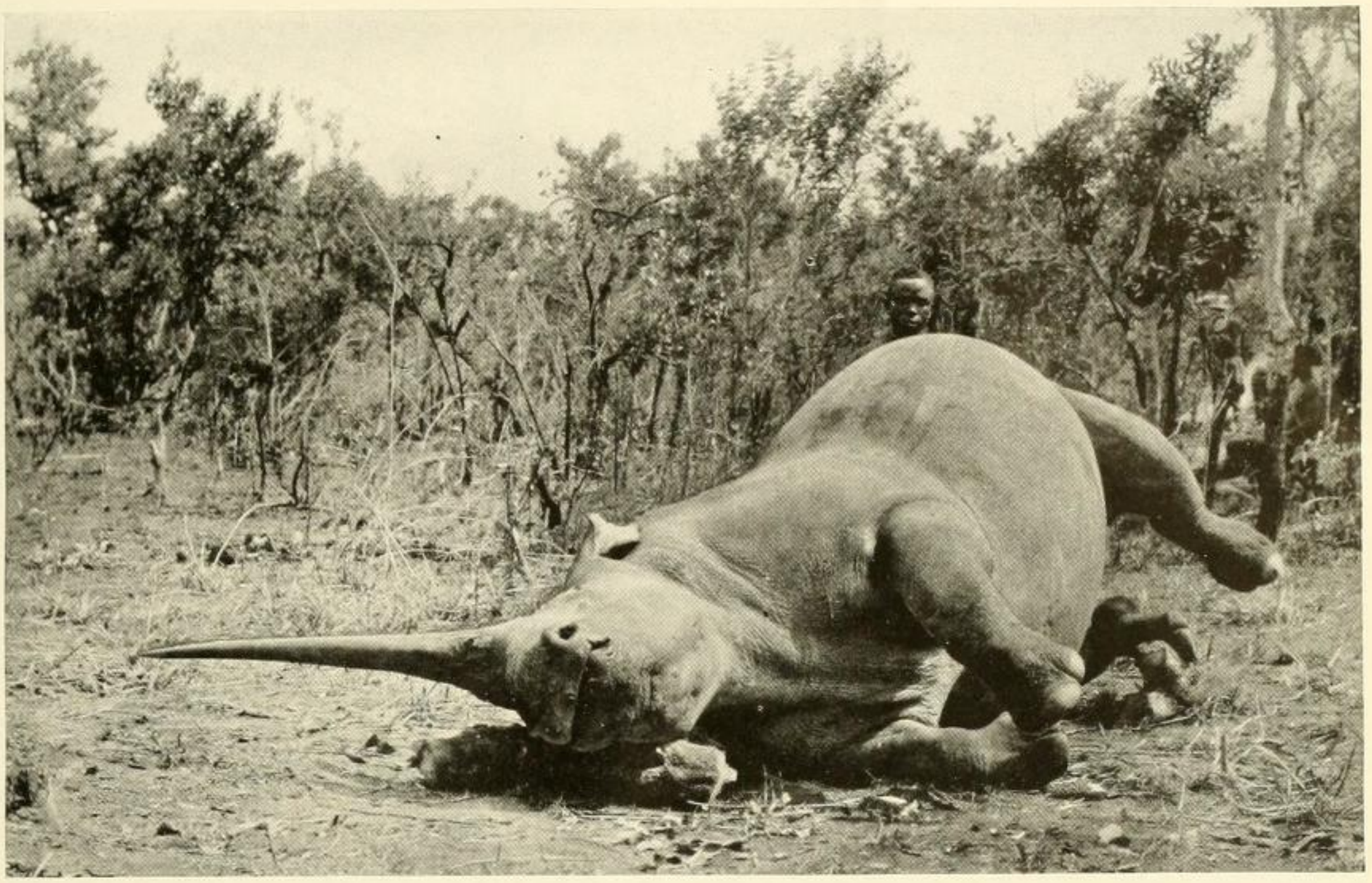
Height of a Bull

While the length of horns previously known from that region does not exceed three feet, this male from Faradje, in the Uele, constitutes a record for the northern form *(C. s. cottoni)*, with a forty-two inch front and twenty-two and one-half inch rear horn. The female is an equally remarkable partner, her front horn measuring thirty-six and a quarter



TWO DAYS AFTER BEING SPEARED BY NATIVES

Decomposition has loosened the mass of minute fibres fastening the horns to the skin, which runs without interruption beneath the horns. Here a part of the skin one inch thick, has been cut out to show the naso-frontal bones below.



RECORD COW WHITE RHINOCEROS

A fit partner to the bull figured in the frontispiece. Her size can be judged by comparison with the standing native. The front horn measured thirty-six and one quarter inches, and the rear one twenty-two and one half inches. A side view is shown on p. 73.

inches and rear one twenty-one and one-half inches. The great development of both rear horns is unusual.

Those two huge rhinoceroses, together with a young specimen, now are in the American Museum and long since have been imbued with lifelike appearances. Indeed the artistic skill of Messrs. Carl Akeley and J. L. Clark in modeling the group arouses the admiration of all visitors who behold these huge dark monsters. Many ask: "Why do they call them white?" The story is a simple one:

Causes of Color Names

Formerly the two kinds of African rhinoceroses, the black and the white, were fairly common in certain regions of South Africa. Their habits being vitally different, it is probable that in the same regions they looked different. The white rhinoceroses depend to a great extent on wallowing places, and a mud bath is an absolute necessity. Though their rough hide normally is dark gray, after every plunge their "coat of armor" gradually changes to the color that the mud assumes when dry. The bulk of the dirt is rubbed off at once against bushes and tree trunks, or when the rhinoceros rolls about on the ground. The body temperature dries out the rest and the blaze of the tropical sun often adds a glare to the white, or fire to the red tones, and also deeper shadows to the darker hues of loam. But after only a few hours, every trace has been shaken off.

The color of these rhinoceroses therefore depends at times on the reddish-brown, black, blue or whitish mud of the mires in which they have wallowed. In South Africa those who originally coined the name "white rhinoceros" may thus have seen them as they were self-painted by "white" earth. I have even observed one a dark green, still covered with the scum of algæ from a pond near a papyrus swamp. Others were jet black from passing across a portion of the veldt recently swept by grass fires. Perhaps the charred, cork-like bark of certain trees had helped to make them such terrible looking monsters. In addition, hundreds of well-scoured places on the veldt, often near waterholes, testify how fond they are of taking dust baths, which may contribute to a still different aspect.

ZOOLOGICAL SOCIETY BULLETIN

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Each author is responsible for the scientific accuracy
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Elwin R. Sanborn, *Editor*

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Habits Affect Distribution

The distribution of the two species of rhinoceroses, "black" and "white," has been greatly influenced by certain peculiarities of structure, feeding, and other habits. The browsing black rhinoceroses strip leaves and twigs from bushes with the triangular, prehensile process of the upper lip, and are found in a great variety of places. Though the rolling portions of the savannah are preferred sites, they may live in forests, where I have seen them on the slopes of the Rift Valley and foothills of Mt. Kenia. Yet they also find a livelihood in really arid tracts where no white rhinoceros could live, subsisting mainly on the xerophilous scrub, which, with its green, succulent aspect, seems to belie the general parched conditions vouched for by the many thorny elements. They of course care little for wallowing places.

The grazing white rhinoceroses feed on nothing but common grasses. Grassy plains and an abundance of pasture are an absolute necessity in their habitat. The horny edge of the lower lip (see photograph, p. 73), usually hidden by the overhanging snout, seems to have escaped the notice of all previous observers. As no incisors are present this ridge greatly facilitates the cropping of fodder. The resulting muscular movement explains the characteristically great width and depth of the bony portion supporting the chin, which is slim and pointed in other rhinoceroses. The food is well masticated between the broad and flat grinding surfaces of their molars, which contrast with the high, crushing ridges and sloping deep grooves of the relatively smaller teeth of their black relative. In these tropical regions the grasses favored lose their succulence soon after emerging from the ground. Drinking water to aid digestion then becomes all important. Just about the time the last puddles dry up these white rhinoceroses find large sections of their haunts becoming arid. All wallowing places are then deserted, even the few connected with trickling springs that retain some moisture, and only in the rainy period do the huge beasts scatter again.

The Southern White Rhinoceros

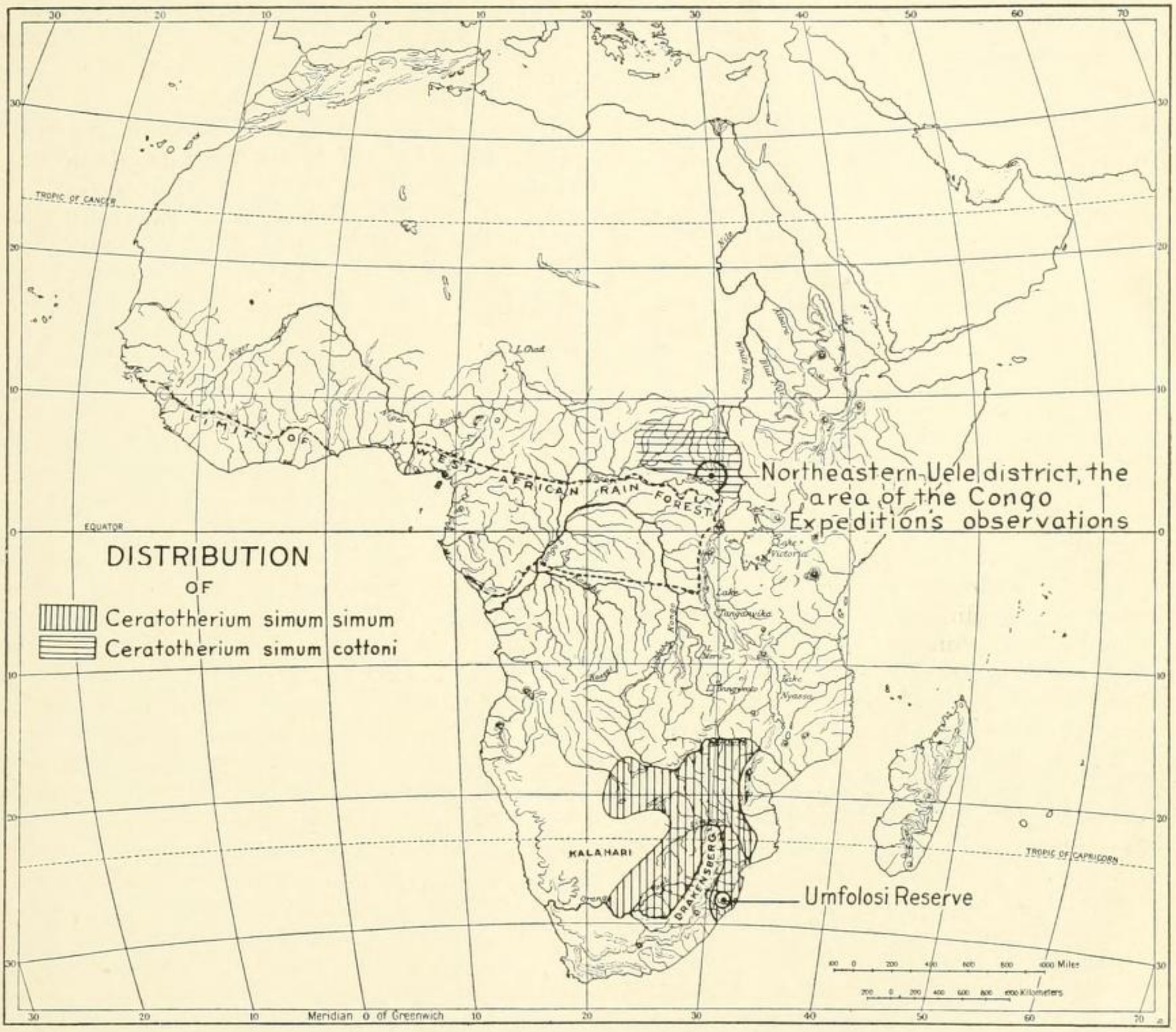
The area of the former distribution of the white rhinoceros in South Africa *(C. s. simum)*, as determined from available information, hardly ever attained more than 300,000 square miles. Probably it was much less, as they inhabited chiefly the grassy regions between the middle Zambesi southward to the central section of the Orange River and Natal provinces. All localities of their actual occurrence fall within the range indicated on the map shown herewith. Damaraland, erroneously attributed to Andersson and quoted by a few recent authors, has been excluded. His first white rhinoceros was killed just southwest of Lake Ngami, "at Kobis," which, together with the more southern Kuruman, also in Bechuanaland, represents the easternmost limit of the species. No white rhinoceroses ever have been known west of, or in the Kalahari Desert proper, nor from the Drakensberg Range in the east.

Range of Northern Race

The range of the Nile-Congo race *(C. s. cottoni)*, a form discovered as recently as 1900, was believed to be restricted to the Lado country and the immediate neighborhood of the Nile. Contrary to all surmises its range has steadily increased. These white rhinoceroses are now positively known to extend from a little north of Lake Albert to three hundred miles down the Nile to a point near Shambe. From there it stretches four hundred and fifty miles westward to the Dar Fertit section, and two hundred miles south to Rafai.* The southern limit extends about five hundred miles across the northeastern Uele district to the territory northwest of Lake Albert. This habitat thus forms an oblong area of about 100,000 square miles, all situated west of the Nile, which is the eastern limit of their dispersal.

Southward their haunts reach to the forested and hilly transition belt just north of the West African Rain Forest, but in the north and west the boundaries can not be considered definite. They might ultimately be found along the grassy outskirts of the Sahara, just as in South Africa the southern form was at one time abundant about the edge of the Kalahari Desert, near Lake Ngami, and in eastern and southern Bechuanaland. In the west, one can point to

* Schouteden, Rev. Zool. Afr., I, fasc. 1, 1911, p. 124.



FORMER AND PRESENT RANGES OF THE TWO WHITE RHINOCEROS SUBSPECIES

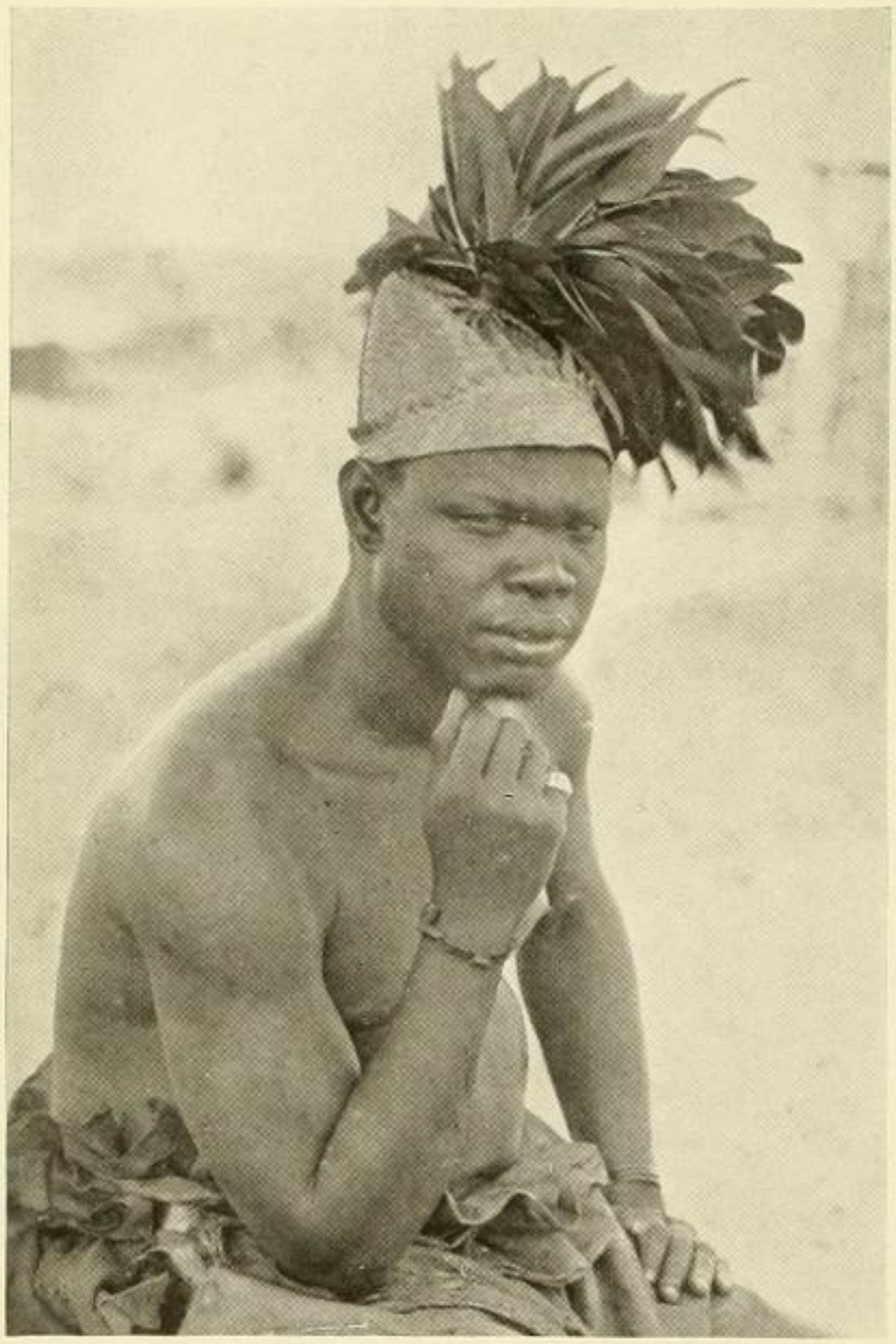
The South African race is now extinct save for a very few individuals still living in the Umfolosi Reserve, Zululand. In their northern ranges, with the Nile route open, white rhinoceroses are afforded little protection. The map shows the easy access to the home of these monsters by way of Khartoum, the point of departure for steamers bound southward.

the hopeful omen of the presence of black rhinoceroses in the Niger-Shari districts, south of Lake Chad, especially as both species were found together in many regions of South Africa.

According to the information of Maruka, an intelligent native chief of the Logo at Faradje, it may be possible that in former times the two kinds of rhinoceroses shared their ranges in the northeastern Uele. He told us that when the rinderpest swept across Africa from the northeast in the early nineties, the rhinoceros feeding on bushes died out, together with most of the buffaloes, elands and antelopes, and never appeared again. Only in the last ten years have the white rhinoceroses and other game become sufficiently numerous in that section to figure once more in the natives' larder.

Gap Between Two Ranges

The great gap between the northern and southern ranges of white rhinoceroses represents a territory over 1200 miles long. So far no positive proof of their former occurrence there has come to light, notwithstanding various reports to the contrary. In regions where hyenas abound and long rainy seasons accelerate the destruction of even the heaviest bones, the chances are slight that their remains have found a safe burial, to come to light again as witness to former flourishing times. In ages past Africa has changed, though less and more gradually than other continents, and instead of whole mammal groups being completely wiped out, some were able to hold their own in scattered areas. Interrupted distribution



MARUKA, THE GREAT CHIEF OF THE LOGO
In his territory the regular annual toll of white rhinoceroses killed by natives for meat exceeded forty.

among living groups of African mammals is a natural condition, and not so rare as generally believed.

The Black Species

Even so decidedly widespread a species as the black rhinoceros cannot boast of a continuous range, though it is found yet in many sections of South Africa and all the way north to Abyssinia, neighboring parts of Egypt, across the Sudan to the eastern bank of the Nile, and also in Angola, and the Katanga district of the Belgian Congo. At present it is totally absent from all that territory known as the range of the Nile-Congo race of white rhinoceroses, though, as stated, occurring again in the Shari-Niger region south of Lake Chad. Thus in the north both species apparently live apart.

Near Extinction of Southern White Rhinoceros

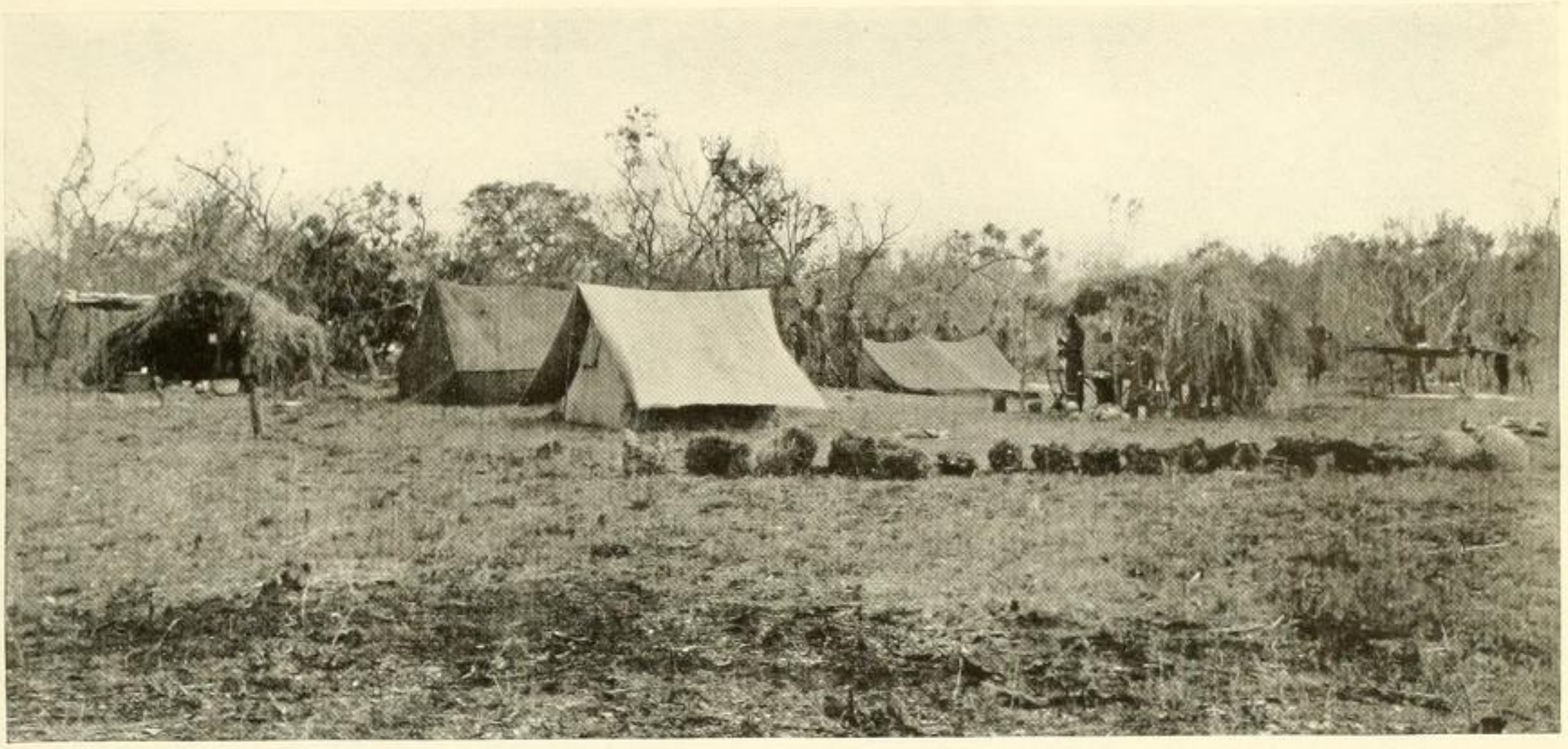
Of the habits of the only white rhinoceroses still alive in South Africa Vaughan-Kirby* has just published an interesting study. There, in the Umfolosi reserve in Zululand, embracing an area of about 90,000 acres, and for the greater part situated between the Black and White Umfolosi rivers, both the prehensile-lipped black and square-mouthed white rhinoceroses live under natural and undisturbed conditions. For some strange reason their number in this last refuge, stated in 1910 by Stevenson-Hamilton to be "some fifteen" seems now to have dwindled to "some ten" individuals, according to Heller's reference, later quoted by Vaughan-Kirby, who nevertheless gives assurance that reproduction is proceeding as rapidly in the reserve as in the Congo-Nile region.

Habits and Temperament of Northern White Rhinoceros

In the field one need not worry much about dangers from aggression by white rhinoceroses. All those who have wandered the veldt know the fascination of tracking hour after hour under constantly shifting winds. Finally the reward may be to catch a glimpse of what perhaps promises an exciting adventure, but now, beyond the hazy screen of thicket, looks merely like an outcropping boulder. These rhinoceroses, gregarious, sociable, and piglike in many ways, lie down helter-skelter in the fashion of heedless vagabonds. An occasional snort and the rumbling of gases in their intestines alone break the dead silence of a tropical noon. Instinctively and as in a dream their ears continue to fan the air, the eyelids twitch, the muzzle quivers, and the tail whisks off the hosts of harassing flies. The shifting of a bulky head or the fidgety turn of a body will not disturb a herd. But at the slightest evidence of your presence their elbows jerk the forelimbs from beneath the body. One or all may sit up in dog fashion on their haunches, listen and sniff, and if all is well, lie down and quietly drowse again.

Once roused from rest the sluggish body is full of hesitation; and doubt and fear are easy losers. The massive brutes seem suddenly to realize that the traditional freedom of their haunts is at stake. Bewilderment is changed into blind fury. With astonishing speed they dash across the veldt. Sharp horns, swift hoofs, mighty weight, and hide like solid armor, they recognize no obstacles. The clumps of bushes, gnarly scrub, entangled masses that no one has yet dared brave are trodden down and brushed aside like trembling blades of grass. The weirdness of the crashing sounds, the booming of the thundering progress fan still higher the flames that furnish energy and motion. Yet one cannot help but note how quickly the fearful rush gives way. Soon they trot and

* Ann. Durban Mus., II, part 2, 1920, pp. 223-242, Pl. XXVII.



CAMP OF THE CONGO EXPEDITION NEAR FARADJE, IN JANUARY

At this period, grass fires sweep the country and camping sites are cleared to prevent accidents. In the foreground, the row of loads contain accessories for a habitat group ready for transportation to America.

then they walk in stupid lassitude, glad to use the easy, deep-worn trails their aimless wanderings shaped so long ago.

Hunting the White Rhinoceros

With our base camp at Faradje our numerous side trips brought us one might say into the very midst of the white rhinoceros population. Once for over seven hours we had been following various trails, and toward noon we came upon a bull that had broken away from his companions and was feeding alone on the edge of a swamp, eagerly nibbling the grass. This stately brute, ordinarily a rock of immobility cast into living flesh, was moved by only hunger, rage, fear and love. During the night he had gone hungry, his time having been spent in riotously prancing about a cow. The freshly burnt ground gave an exceptionally clear record of his movements. Uninterested in her lover's display, the cow, like the other members of the herd, had apparently continued to enjoy the succulent blades of grass that had sprung up among the bristly, charred tussocks.

A whiff of air from our direction sent him off at good speed until he reached the trail. Then he slowed down to a saunter, to join his company of five. Though he must have known them well, he carefully investigated their deposits along the trail, following suit himself. But our conclusion that the bull would help us find the others was wrong. Many times he stopped, away from the trail, waiting for us "around the corner." Once he truculently trotted up to within twenty yards. Presently he snorted, and then evidently took fright at the click of the camera, for most unexpectedly he gave a shrill whistling sound.

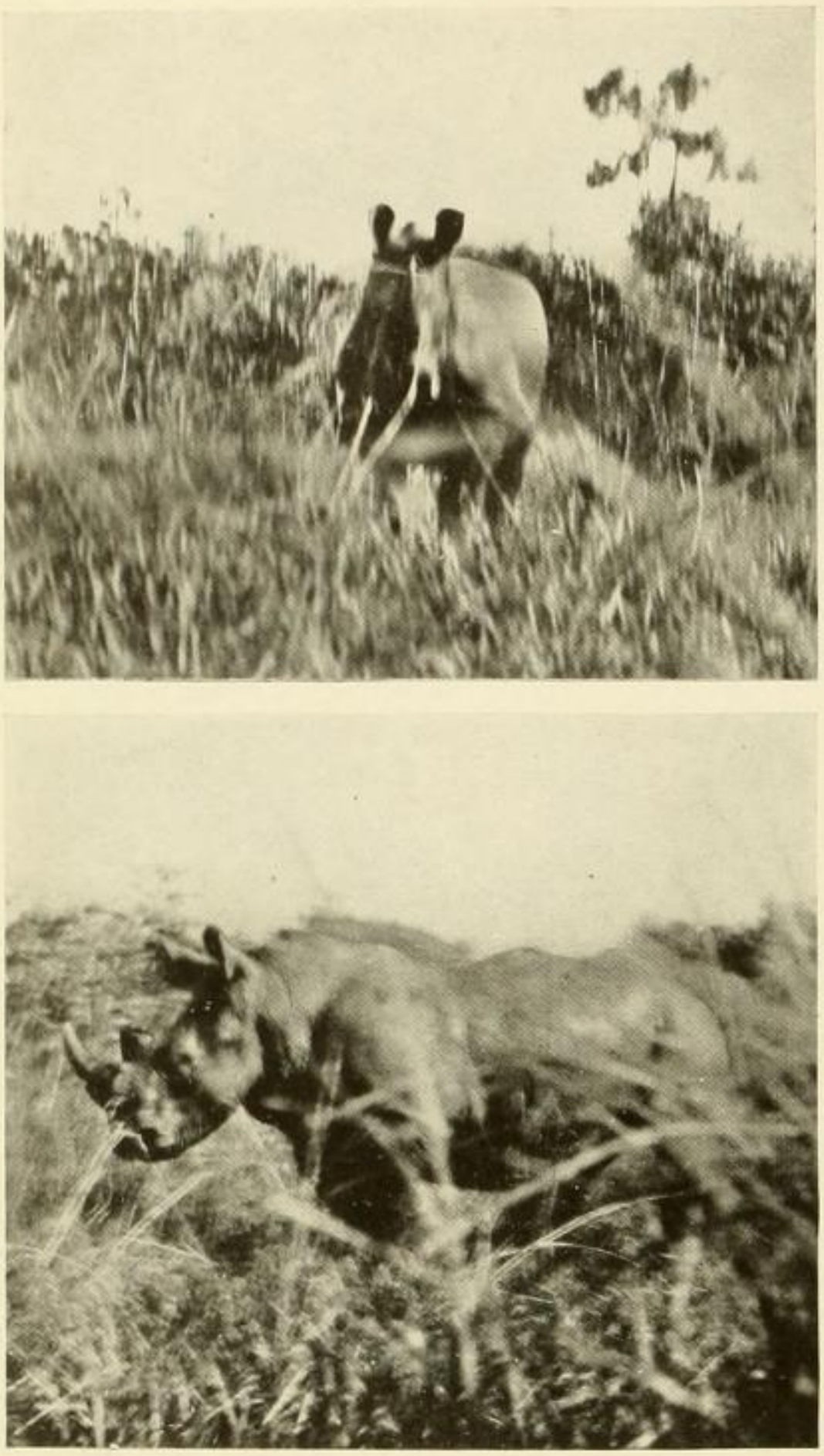
Following him for about three miles across country, no further chance to photograph seemed possible. We had wasted our time and now it was too late in the afternoon to find another fresh trail.

A Mix-Up with a Herd

Suddenly, as we were quietly waiting for our black porters to come up, Balla, a very plucky native, jumped to his feet with a warning cry. The ground trembled and the jungle sighed. Our bull had returned, but not alone. Six big rhinoceroses passed like a living tornado a few yards away. Had they charged straight upon us we could hardly have escaped!

A Calf Taken

But not all of them vanished into space. Near us a calf began to squeal frantically, because it was transfixed by Balla's spear! Our hunter's irrepressible zeal had snatched the youngster from its mother as the herd dashed by. There was a question whether the mother would return, until at last the noise of the band as it crashed through the jungle became less distinct, and finally died away. We had been taken completely unawares. The sandy ground near the great swamp had effectually muffled the approach of the frightened monsters. Little time there was then in which to wonder what had started the herd on its maddened course, for



AT BAY AFTER A TWO HOUR CHASE

Although wounded, this young bull traveled about ten miles across country. Mr. van de Kerkhove with his rifle courageously covered his quarry, so the author declares that he "took no particular risk" in photographing the maddened brute.

now we had to take care of our unexpected prize, which was needed for the habitat group.

On another occasion three of us passed within a few yards of a good-sized bull. The tip of his horn as it rubbed against a clump of trees, was just visible, but the high grass and occasional bushes had cut off our prospects of taking a photograph. My friend, Judge Smets, thought he could head off our quarry and cautiously advanced. We waited. It was not his intention to shoot, but a sudden detonation from the express rifle drowned every other noise. The rhinoceros had turned upon him, and he fired over its back.

Balla Spears a Huge Bull

Now, with the beast thundering through the brush it raised the wrath and courage of our native hunter. Balla acted as if the firing pin had nerved his heart anew and given strength to every muscle. A few leaps, and the thud of his spear brought forth a squeal from the maddened brute. Yet the famous Azande lay prostrate in the track of his victim, unharmed, to be sure, but how could he withstand the force that hurled his six foot lance? Cutting through the middle of one of the animal's ribs and penetrating half a foot beyond, the spear caused a stream of blood to gush forth from its nostrils. In the mad rush through the jungle the shaft splintered, the blade bent and the vital organs were still more lacerated.

Balla was now deaf to all questions, his mind set on murder as he thought of the meat that would nourish his family and the deed that would stamp him a hero even in this land of many hazards. Crawling forward on his hands and knees, he found a branch torn down and trampled upon in the wild stampede and covered with clots of blood. This aroused him to fresh exertions. Presently he recovered the shaft of his lance and smeared it with the gore of his victim to insure future good luck. Twice he slapped his hands against his thighs, meaning twenty, then with the left hand counted five and raised four fingers. This was the twenty-ninth rhinoceros to fall to his spear!

Great Effort to Make Photographs

Of our many attempts to take photographs from life, the following episode is typical. Before daybreak Judge Smets, Matari his faithful gunbearer, and I, with Alimasi my fearless Mangbetu, dived into the dark gray mists of the apparently unknown. Matari had been scouting for the last two days. His report held out a good chance for me to

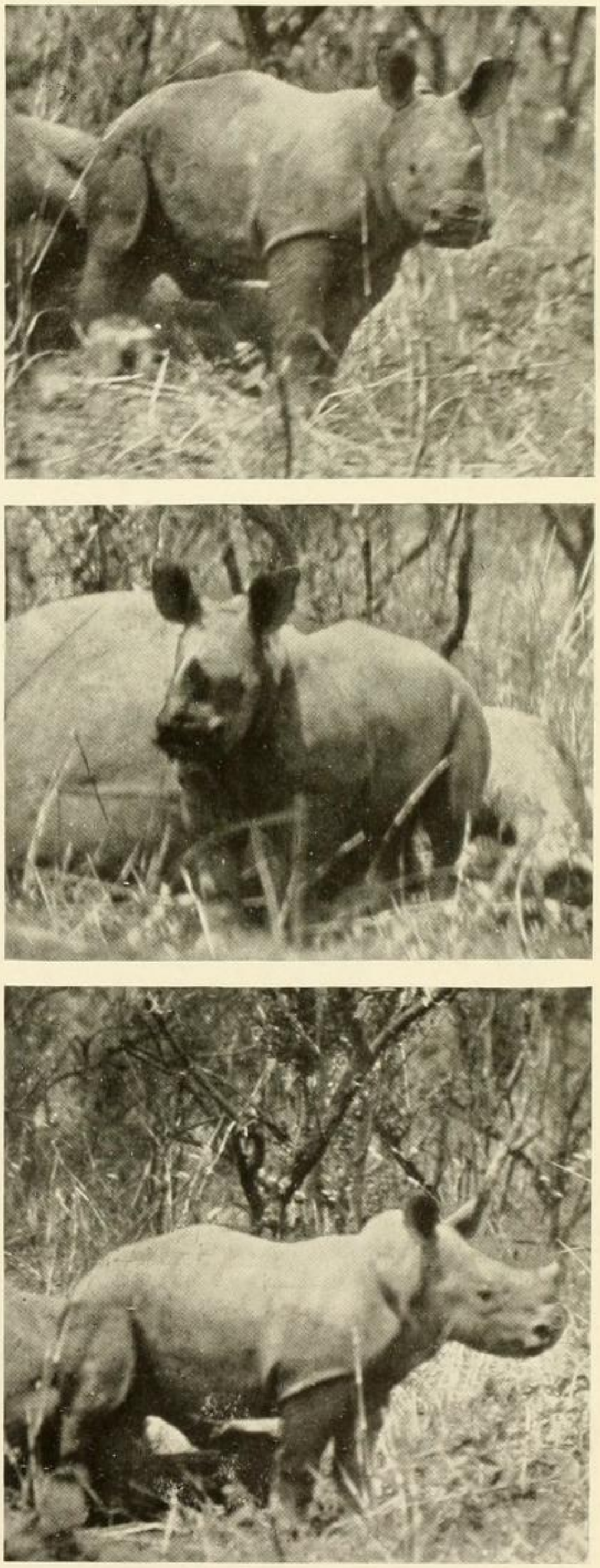
take photographs of live rhinoceroses. A heavy rain had fallen and ceased shortly after midnight, and this incident greatly favored our enterprise. Finding tracks that were perfectly fresh, we proceeded to follow them without delay. A glorious sunrise swept off the last vapors and by ten o'clock the intense heat made it certain that the troop of rhinoceroses we were after must have settled down to rest.

We found that the great beasts had satisfied their thirst in a nearby swamp, and at the first wallowing place the stirred-up mud revealed that they had been having the time of their lives. How many there were could not be determined. Footprints on the trail a little beyond showed three had entered the jungle, but the old bull, by far the biggest animal, had passed on. Crossing the hill in a hurry we saw by the trail that the members of the herd had rejoined one another. After scanning the expanse of short grass of the lower lying morass right in front of us, we decided to make a short cut to the next plateau, where we hoped to find the rhinoceroses sound asleep.

Only a few words were spoken, and then a sudden commotion, several hard snorts, and a wild rush were our punishment for having broken the silence. The bolting of our quarries, which had been standing in the high grass only twenty yards away, seemed to announce that surprises might be the rule of the day. Now that their vigilance was aroused we might have a long chase and it would be far better for us to go slowly and give them a chance to allay their fears. Though it was still an hour before noon we halted to take a bite and soon were loudly joking.

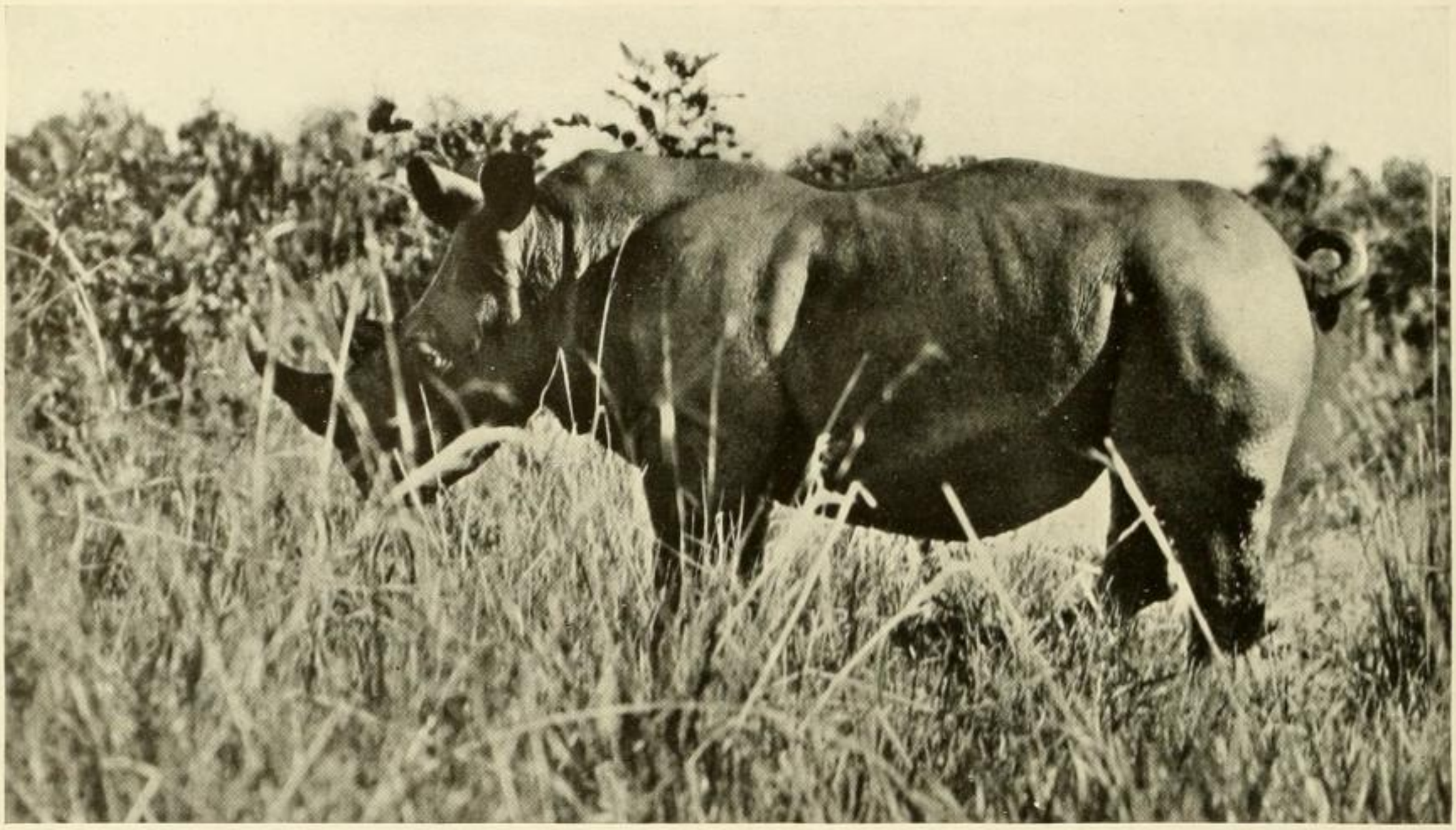
Twenty minutes passed, when, "What was that?" Matari dropped the food from his mouth and stared straight ahead, blank consternation seemed to have paralyzed him. At first no one dared to move. He and his master soon stood ready with their rifles. Our rhinoceroses had returned and we could now see their dark gray backs hardly ten yards away. Mr. Smets was happy and motioned me to take photographs. Certainly it seemed an admirable chance, but every blade of grass in front of the rhinoceroses enlarged itself to the size of a curtain on the mirror of my graflex camera. We all went back to the trail, the Judge alone would try to turn them, and if this were impossible, he decided to wound the bull.

Anxious seconds, minutes, and a half hour passed. Finally a shot rang out, followed by



LOYAL TO THE LAST

A bull calf white rhinoceros, standing guard over its dead mother. Rushing forward and trotting about, he snorted and whistled like a steam engine. In the side view the distinctive nuchal hump of this species is already well marked.



DANGER SIGNALS

The twisting of the tail is generally followed by an immediate charge, but in open country like this, one can easily jump aside.

the usual uproar of stampeding rhinoceroses. Just at that moment, as I started to rejoin my friend, the most terrific, awe-inspiring squeal and racket arose right ahead of me, and I rushed forward.

A Self-Trapped Bull

What luck! There was the big bull madly struggling but securely caught between two gnarled trees. Blind fury and blustering impetuosity had landed him in this dilemma. His terrific onward rush had jammed his head between the twin trunks, which held him fast. Rage, fright and terror made matters still worse and he had forced both forelimbs through until he was caught and held in living stocks, made by nature. The tree-stems shook, but they were slow-growing partners, not used to bending, and had braved many storms. The violent efforts of the rhino only increased his helplessness. His huge body slipped upward, and in no time the feet had dug out what ground they could still reach. Matari and I frantically worked to tear away a few bunches of grass and to cut some of the bushes, so I might focus. Dead silence ensued for a moment. Our captive gathered his strength, sank back, and feeling firm ground, he reared up, and on coming down again he was free! The tree nearest to us had been weak at the base, and it simply had to give way. The Judge rushed up just in time to see our prize disappear with tail in the air.

Judge Smets Shoots a Big Bull

The cause of all this was that after we had left Mr. Smets, he with infinite patience succeeded in sneaking up in the high grass to the place where the cow and two younger animals were walking about. Altogether too late he discovered that the bull was facing him, and he had to fire on short notice.

It was not yet noon, and my companion laughingly remarked that my opportunity was still to come. Matari warned us to go slowly, and with fingers on his lips motioned for silence. We followed an easy trail. Our bull merely went from waterhole to waterhole, and from one wallowing place to another, but always heading away from our camp. Twice we caught sight of him going at a fair rate. It was no longer a question of photographing. We would not abandon an animal that might not recover from his wound.

With barely sixty minutes' intermission we had been on the move for nearly twelve hours. Night was at hand and we could not possibly reach camp until several hours after dark. With no moon, it would be pitch black, and if a storm broke loose we would be in for it. I was in favor of taking up the trail anew next morn-

WHITE RHINOCEROS AT HOME

When hunted during the torrid hours of the day, they love to cool off and linger in far-extending swamps.

ing, but the Judge wanted to continue for another half hour.

At Close Quarters with an Angry Bull

Ten minutes later Mr. Smets and Matari, with rifles shouldered, were a hundred yards ahead. This was the one day I did not carry mine, and now I even turned my camera over to Alimasi. In this short grass country I felt sure a wounded rhinoceros would not lie down. But suddenly, hardly ten feet beyond me, the wounded beast arose like a ghost. He made straight for me. It was impossible to jump aside. Here indeed was the chance of my life, not to photograph—but to run, and to run fast. One glance back and I saw my camera dancing on the back of the oncoming brute. Alimasi had hoped to turn his course by hurling my photographic outfit at him, but on he came faster still.

Just one cluster of gnarled trees about sixty yards off was my only chance for safety. Both the rhinoceros and I went at top speed, and both landed at the same spot. When I dared look again there was not an inch between me and the source of furies. In fact the sharp tip of his front horn reached beyond my ankles. But he was in front of the trees and I behind, as safe as if an iron wall had sprung from the ground.

With the terrific rush he had rammed his horns between the trunks, in that one stroke concentrating all his revenge. For the second time that day he was caught, now held fast by the horns. Try as he might he could only groan and rage. Finally with a mighty effort he broke free. Mr. Smets, rushing up, aimed, shot, and brought him down in a flash. My friend took no further interest in the noisy brute, and, turning to me, started to joke, but I was still absorbed in its struggles.

And then, heavens! It rose again, shook itself, and started to run. The Judge would not fire a second time. He knew he had hit his mark. With every step the rhinoceros gained greater vigor—and suddenly turning, disappeared in the jungle.

"What did you look for in your left pocket when you were playing hide-and-seek with the rhinoceros?" Mr. Smets asked, "Your pistol was at your right." I answered, "It was of no use for me to shoot with a pistol. I wanted my spare glasses, not to lose one precious moment of a spectacle one can not see twice." This was the finale of our day's work—it had all the settings of a movie story, and with not even a line of pictures to show.

The Bull Was Secured

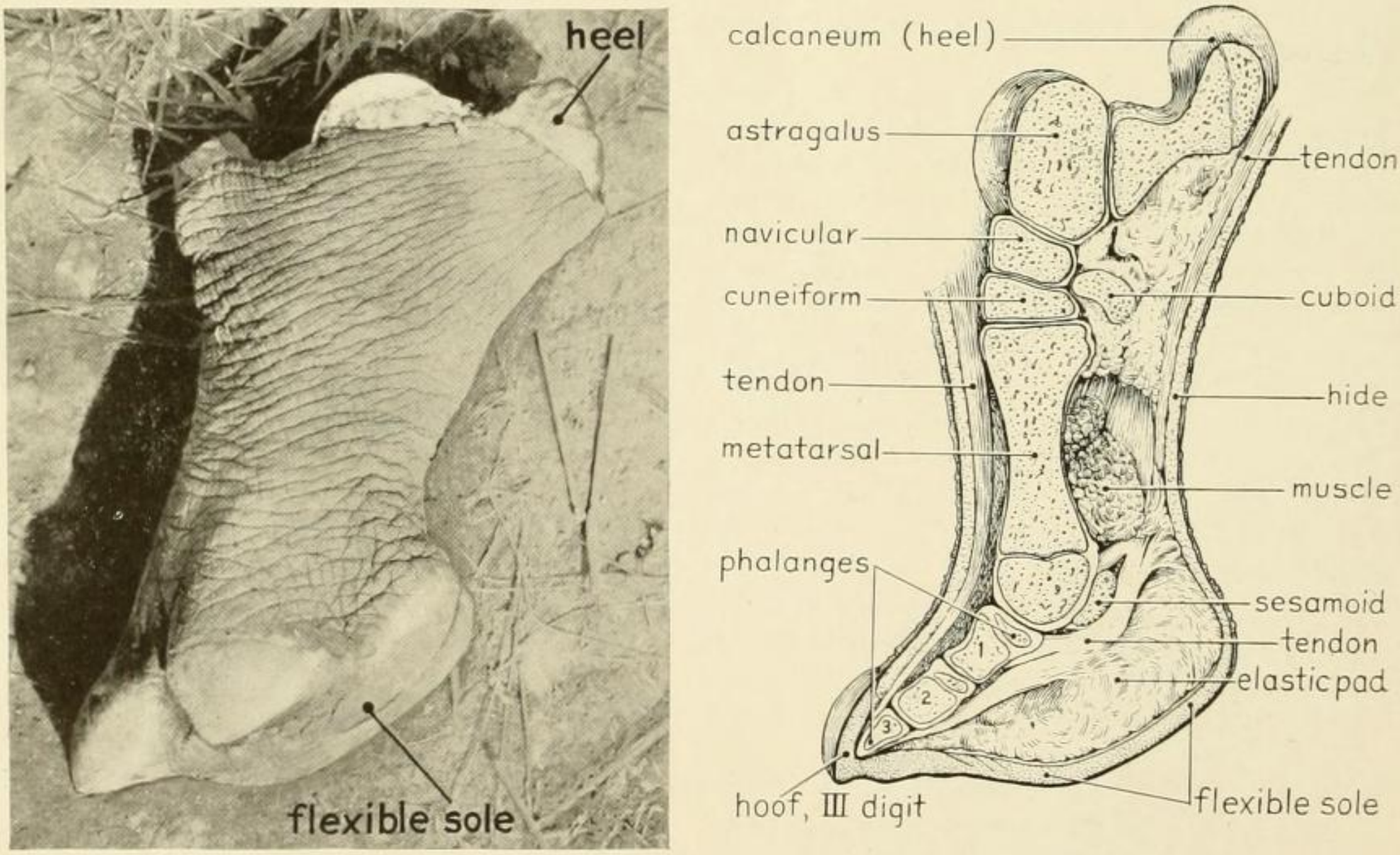
The night was cool and we hurried, too tired to walk slow or to stop. At ten we reached camp. Next morning at daybreak I saw the Judge's swollen foot protruding from the blankets; he had run against an

iron-hard root in the dark and would have to rest for days. Matari and Alimasi Mulai, six of the skinners, and ten porters left with me. By eleven our bull was discovered, totally unable to give further surprises. After leaving us he had run at a good pace for a few hundred yards, then slowed down, and his last three miles included many stops. Mr. Smet's first shot had hit exactly in the middle of the fleshy hump. His second, after the bull's charge, had torn through just above the vertebræ, stunning him for a moment, but not preventing his last dash. Two days afterward, horns, hide, and skeleton were on their way to Faradje.

SOLE OF LEFT FRONT AND HIND FOOT

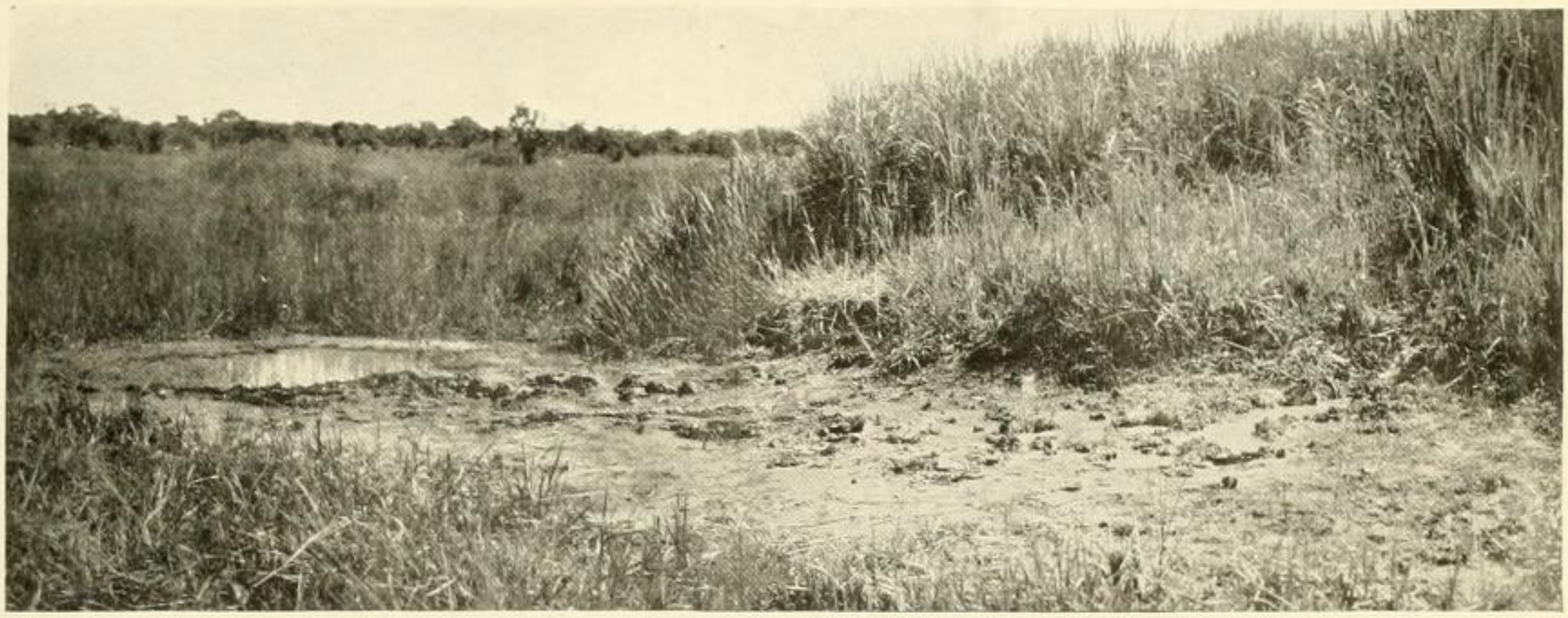
In these odd-toed Perissodactyls, the middle toe is much enlarged, and the sole of the hindfoot is elongated. The hoofs of the white rhinoceros are nail-like, but of peculiar shape.

As an example illustrating their more peaceful disposition the following incident is instructive. I was camping for a few days in the veldt north of Faradje, not far from a trail near the Aka River, where rhinoceroses often crossed eastward to the savannah. The grass shelters of my thirty natives formed a wide semicircle which was closed with our workshop. My A-tent, just large enough to hold a sleeping bag, occupied the center. Toward dusk it rained quite hard and though in these regions one keeps no night fires burning, it had been cool and some of the natives warmed themselves before a few smoldering brands, which were later extinguished by another shower. The stillness after the storm had lulled us all to sleep. In the dead of night I was suddenly roused. Instinctively I grabbed my pistol and felt for my rifle. What was prodding me from the rear of the tent? Matari's warning click meant danger. "Rhinos are in camp," he whispered, "be careful." Faithful as ever, he was lying alongside, rifle in hand and ready for any emergency.



HIND FOOT OF CALF KILLED BY LEOPARDS

At every step, the bulging, flexible sole is flattened by the tremendous weight of the body. As shown by this drawing from a cross section made in the field rhinoceroses walk on tiptoe. The great pad of elastic tissue absorbs all shock like a rubber heel, and gives an easy and secure tread.



WALLOWING PLACE OF WHITE RHINOCEROSES

Tracks and churned-up mud marks of an early morning frolic at the edge of a pool, a few feet below the level of the savannah.

Rhinoceros Herd Invades Sleeping Camp

Here I was in a real trap. The tent was securely closed and mosquito-proof as well. With rhinoceroses in front I could not open it and even the noise of ripping the back might make things worse. Carefully unhooking one corner, I peered out. There in the darkness fifteen yards away, four monsters were sniffing at the ashes in front of one of the shelters, from which the natives had long since fled. For ten minutes Matari and I anxiously watched our uninvited guests wander about. Finally one of them ran into a pole supporting a crate upon which a skeleton was stored out of reach of hyenas and leopards. With a crash the platform came down, and then great was our relief and surprise to see the night-prowlers make off at a fair pace.

Hardly were they out of camp when the fires were burning again brightly. Native dances started and songs rang through the midnight air. Over and over echoed the monotonous refrain: "The rhinos' strength was bewitched, and like sheep they had to leave the white man's camp."

Visual Powers of the White Rhinoceros

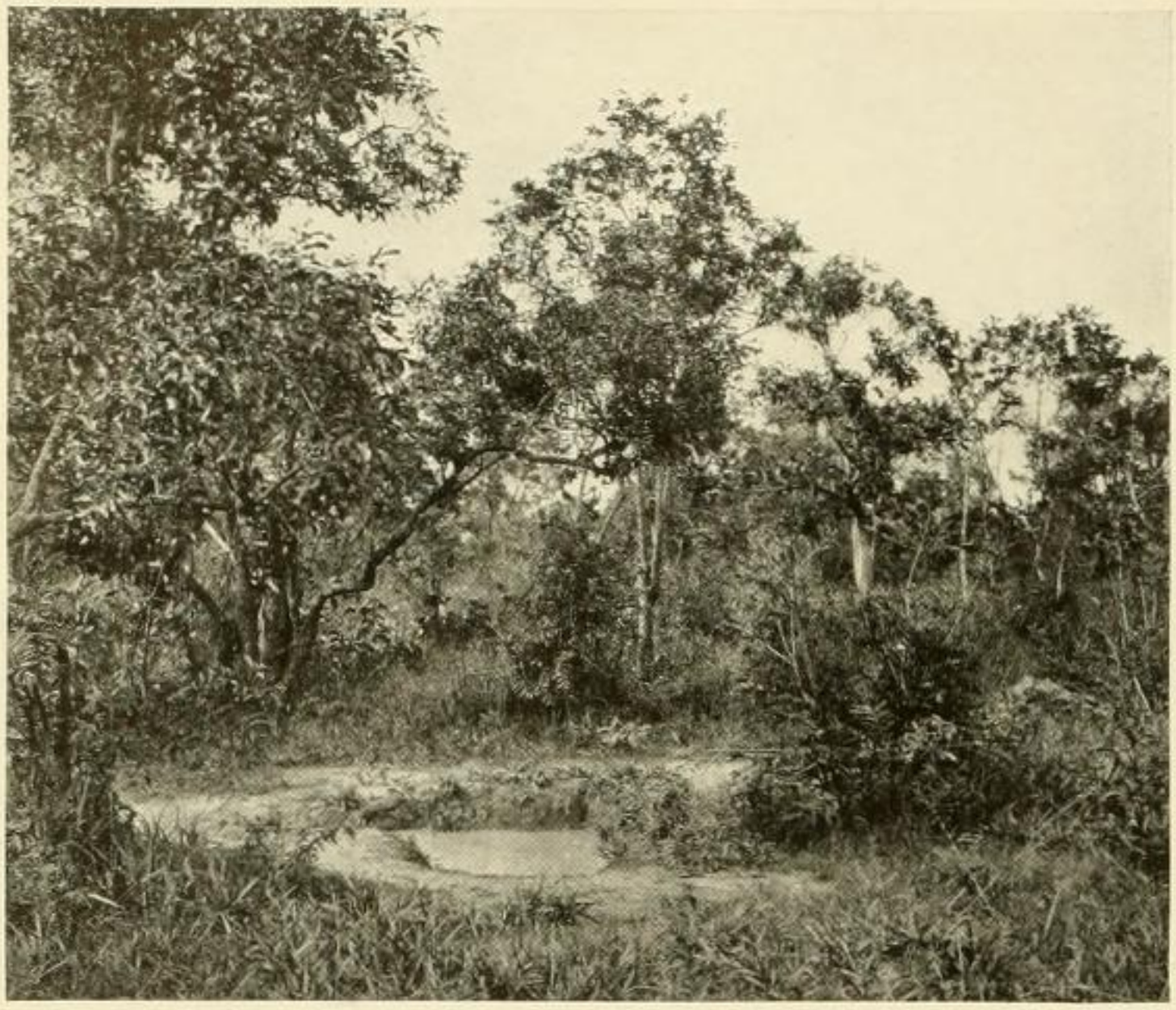
I had always supposed that the sight of these animals, known to be poor, was more acute at night than during the day. But though one of the rhinoceroses had stared in my direction for a considerable time during this visit, his interest was not aroused, even when I later moved around. The orbits are small and well protected by a series of skin folds or pads that effectively shield them from injuries during wild stampedes. Visual power certainly plays but a small part in agitating the usually sullen mood into fury. Should a rhinoceros hold its head in a horizontal position the eyes would naturally look obliquely up toward the sky. The curious angle at which the eyes are placed suggests that they are chiefly used at close range, as during grazing. But it is generally believed that favorable conditions may permit them to recognize at a hundred yards what ordinarily is out of their range at thirty.

Sense of Smell

The sense of smell is admirably developed, but often places the rhinoceroses in the sorry plight of having to content themselves with only such hazy information as the wind will carry. Bewilderment, which is coupled with their hesitation and fear, may be the natural result of their inability to define clearly what danger confronts them. Like men of the old stone age, with but few implements for defense or attack compared with the multitude of destructive weapons in our times, the rhinoceros seems to lag ages behind in the development of its various senses. But relying on smell and hearing, backed up by two tons of weight and irresistible power, it might exist for centuries to come and succumb to none of the ordinary dangers of attack, if it were not hopelessly doomed by modern firearms.

Food Habits

On the ground I was surprised to find at times plants they had accidentally chewed. At first I thought that only strong-flavored herbs were rejected, but this is not the case. A well developed taste discriminates against everything but grass.



THE BEGINNING OF A WATER HOLE

In the midst of the jungle a mere puddle may rapidly be transformed into a deep hole, for with each wallowing each rhinoceros carries off a heavy load of mud.

as stomach contents and droppings also attest. Perhaps such a restricted diet is one of the reasons why no white rhinoceroses have ever reached civilization alive. A careful supervision of their food would undoubtedly help keep these monsters alive after capture. Strange as it may sound the young are easily handled. In 1907 I had the pleasure of turning over to Dr. William T. Hornaday, Director of the New York Zoological Park, a young black rhinoceros I brought to New York from Mombasa, East Africa. I can vouch that the monstrous weight and power is not so serious a drawback. These giant pets show great affection for those attending them and at the slightest call give instant response. Even when racing at top speed a mere whistle will make them brace their four limbs and turn with a rapidity that astonishes every one.

Habits of Black and White Rhinoceroses

Black rhinoceroses live in rather solitary fashion, and stand about or travel with head generally carried well off the ground. Their sources of information being more dependent on the wind are uncertain, a fact accounting for their more truculent temper. Usually their droppings are left along trails, in well established sites, and the large accumulations are thoroughly kicked over and nosed about by other passers-by. Much in the same manner as dogs sniff about, these black rhinoceroses gather information about the presence, number, and sex of their kin. These .nalodorous messages of course are really important for the welfare of their race.

The white rhinoceroses travel with nostrils close to the ground, the whole family within a narrow compass. No special excitement need necessarily rouse them to a spirit of aggressiveness, their information being transmitted through scent, is always close at hand. Their temper is therefore less susceptible to being ruffled by continuous doubt. Unlike the black species, they deposit their droppings wherever they happen to be, usually during the early morning; they may nose them and occasionally scrape the ground with their hind feet, but otherwise leave them untouched.

It would thus seem that the different methods of depositing excreta in the black and white species, are not accidental habits. They probably are based upon fundamental differences in instinct, with a definite purpose, and are related to the fact that in both kinds the eyesight is poor.

Rhinoceros Trails

The impress these rhinoceroses leave upon their habitat bears but little comparison to the general havoc wrought upon a region by passing herds of elephants. True, the latter also have a few well-worn highways, but the daily ten to twenty mile stroll of rhinoceroses endows their haunts with good trails, welcome to all. Relentless habit, softening rains, and hardening action of the sun—these are the factors that have slowly formed the greatest jungle trails in Africa. Here the primitiveness of a one-track brain, the rhinoceroses brutal strength and ponderous weight have forced their right of way, and the results can well compare with those wrought by the American bison. Where do these age-old pathways lead? To native hovels, to far off hamlets, to hard-tilled soil, or to white men's brick-built posts? No! They claim their world, and throw a mighty span across the jungle. The whole savannah, with its level stretches and its hills, the rivers, swamps, luxuriant grazing grounds and barren outcrops all are in

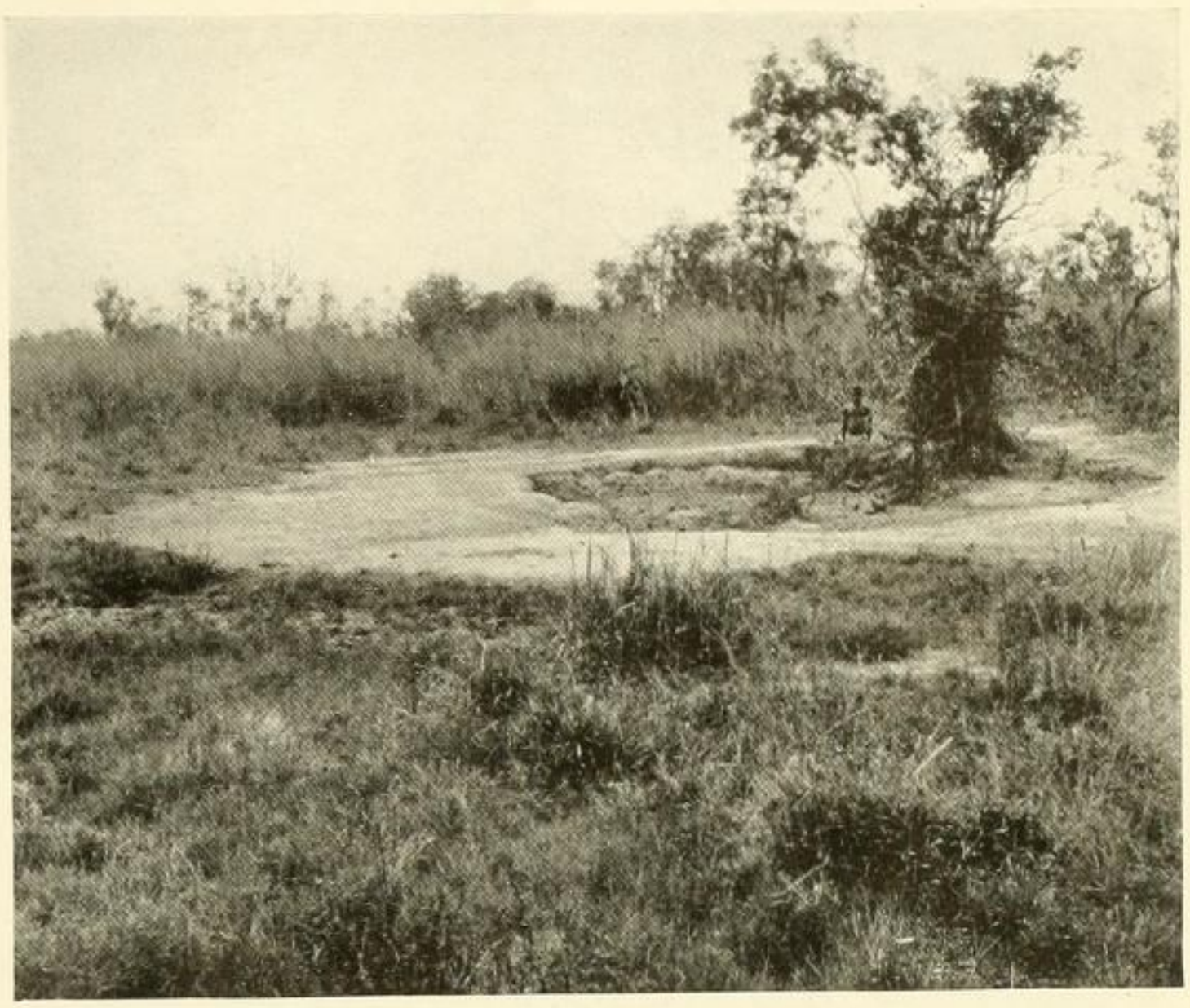
their domain. No narrow-minded spirit has imposed a plan—they follow nature, lead nowhere, and are owned by none.

Feet of the White Rhinoceros

The feet, with three broad-nailed hoofs, leave an unmistakable track and the accompanying photograph shows the differences between the oblong sole of the hind foot and the more roundish one of the forefoot. Consistent with their greater size, the tracks of old bulls are perceptibly larger and deeper than those of cows.

To say that rhinoceroses walk on high heels seems far-fetched, yet this is practically what happens. These mighty monsters step on tiptoe, their full weight resting on a pad of resilient tissues which absorbs every jar and acts in a manner similar to, but far more efficient than any rubber heel. Protected by a horny flexible sole, at each step this cushion of elastic tissue can adapt itself to any surface. Even on slippery, sloping ground, where I saw a big bull giraffe trip and tumble, a white rhinoceros passed safely at a swift pace. As in elephants a rather shuffling gait with steam-roller-like action upon the vegetation is their usual manner of walking. The many broad trails are witnesses to the smoothing effect of their oft repeated travels. In rambles by day or night they tramp in leisurely fashion often in single file, through the primeval wilderness. Speeding on smooth ground any good horse could readily overtake a rhinoceros in the first five hundred yards.

Fleet animals like antelopes or horses are little hampered by the density of the vegetation near the ground. To leap over impediments is like a mere pastime to them, and their high-placed knees and hocks furnish a freedom of action that allows a maximum of speed and endurance. The small hoofs, long cannon bones, compact muscles, and rope-like tendons effect with ease what would be impossible for the ungainly, loose-jointed stocky and short legs of the rhinoceros. The great entanglements of a grass covered brush country demand a new exertion for each step. The lower part of the pillar-like fore and hind limbs terminates abruptly in clumsy, truncate feet, difficult to lift far from the ground; but the relatively short, stout bones, muscles, and sinews are well designed for the tremendous pushing effort needed.



WHERE HERDS GATHER TO PLAY

A mud bath is so necessary to the comfort of white rhinoceroses that the drying out of their favorite "wallows" induces them to migrate. At full length, they plunge about in the mud, much like pigs. Some of the mud is rubbed off on the bushes, and by rolling about on the ground great clearings are worn down.

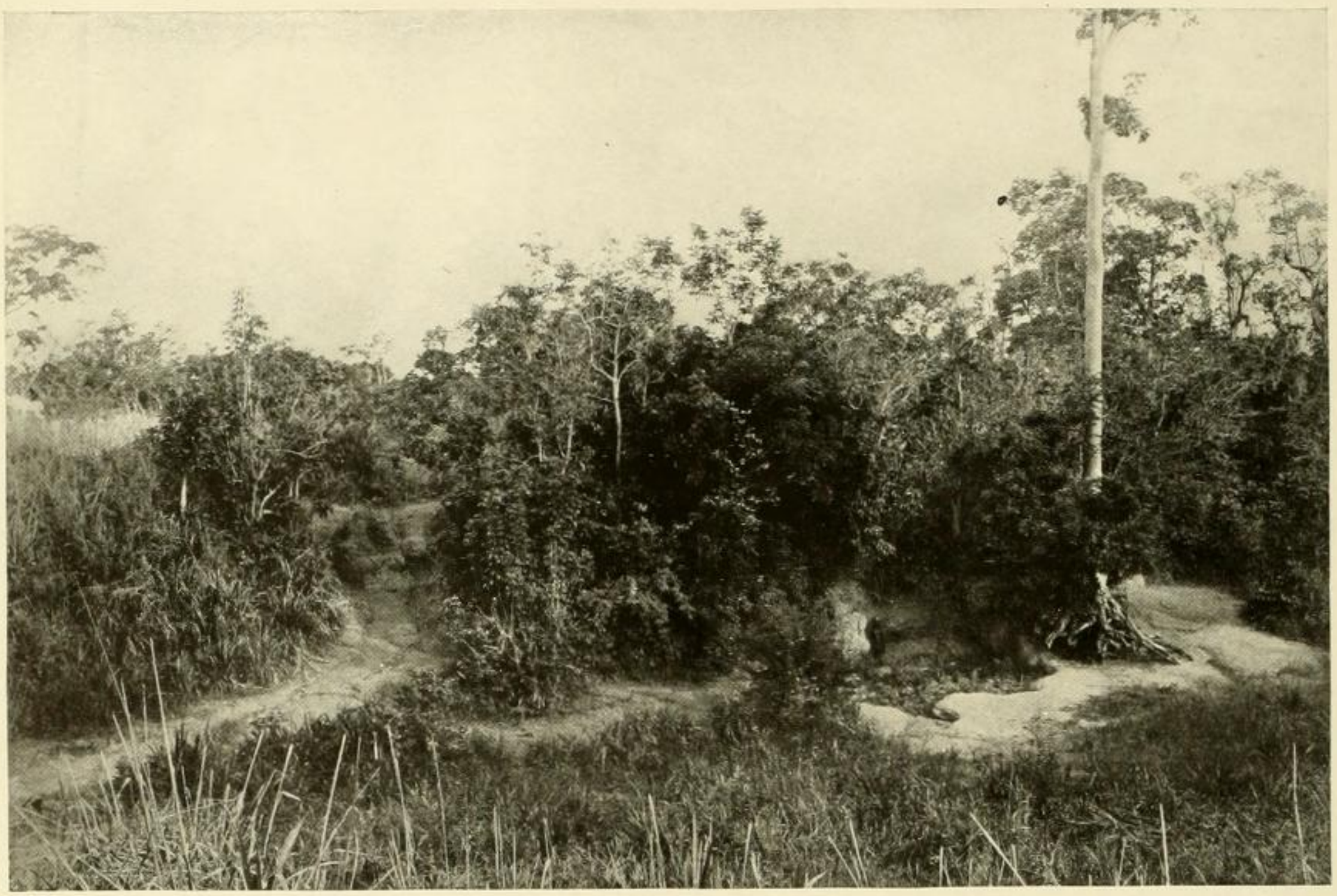
Anatomical Features

Since the motive power is generated only by coarse grass of rather slight nutritious quality the digestive organs are enormous, a living "steam-boiler" hooped by broad ribs and an armor-like hide. The rest of the carcass is but bone and sinew, with surprisingly few large muscles. This is a serious defect in the eyes of meat-hungry natives, and even the hide, roasted and boiled like meat, is not a sufficient compensation; and so in their songs they bitterly complain of it.

Fighting Rare

Only once have I heard of a combat between white rhinoceroses. Their usual, unruffled calmness may suddenly give way to a senseless charge, but a determined struggle, as among elephants and buffaloes, is hardly in keeping with their temper. The solitary bull, fought out of the herd, is rarely met with. Continued breeding seems to foster the formation of small family troops from which domestic pugnacity is happily absent.

With the exception of man they have no enemies but lions and leopards, which prowl about



AN AGE-OLD TRAIL

To the left of the tall tree where the native stands, is one of their wallowing places; an almost daily resort for wandering rhinoceroses.

seeking their young. Near the crossing in a papyrus swamp we came upon the remains of a calf that had been overpowered by two leopards, and later feasted upon by hyenas. Fortunately there was enough left to furnish me a cross section of the hind foot. From the photograph of this preparation the accompanying drawing was made to show its interesting structure. To judge by the tracks there had evidently been a very short struggle, and the mother, usually so devoted to her offspring, had abandoned it. Probably the calf was attacked at the very moment it attempted to enter the water.

The Young

The young rhinoceros shows a great fondness for its mother. At her death the awe-inspiring whistling noise the calves make is proof of their anxiety. In confusion they trot back and forth, deliberately charge, and return again when chased away. However, in two cases such orphans later followed and were adopted by other rhinoceroses.

It is surprising how early the young are weaned. When six weeks old they are practically independent of their mother for nourishment, as we could plainly see by their deposits of digested food.

Breeding Habits

Reproduction is also unexpectedly rapid, though but one young is born at a time. Often troops of five included, besides the adults, a calf, a three-quarter grown and another still youthful member. In spite of well pronounced climatic seasons there is neither a rutting nor calving period, and at any time throughout the year young may be seen. They walk either ahead of or behind the mother and, contrary to general belief, this surely is not a characteristic distinction between the white and black species; but in case of danger the calf invariably precedes.

Insect Pests

Among the smaller pests that may inconvenience white rhinoceroses are various ticks, the most typical of which have a beautiful metallic lustre. They chiefly infest the softer, wrinkled parts of the hide about the eyes, ears, neck, abdomen, tail, and limbs. Credited with removing these insects are the oxpeckers (*Buphagus africanus*),

which, however, in the Uele district and the Bahr-el-Ghazal are far more eager to follow herds of giant eland. It so happens that at least one of these birds always seems to be on the lookout to warn big game of the slightest danger. As the little oxpeckers rise higher and higher into the air their sharp shrill notes act as a magic whip even for rhinoceroses. Without a moment's delay the thud of swiftly moving feet affirms the obedience shown to the tiny feathered sentinels. In long, dipping flight the birds follow their charges, which do not resume the interrupted siesta until the order to move is countermanded. This quick response on the part of those dull beasts seems to indicate that their hearing, like the sense of smell, is not hampered by the lethargy shown in sight and touch.

A Guardian Bird

The oxpeckers' food consists only of ticks, although some hairs are swallowed incidentally. Often they are said to enlarge their hosts' wounds, from which they are believed to gather some nourishment. With their strongly hooked claws they have no difficulty in clinging to the hide of the larger mammals, following herds of game and also cattle. Over the rough hide of a rhinoceros an oxpecker clings and climbs in any direction, head up or head down, like a brown creeper on the rough trunk of a tree. It is difficult to prove whether they actually intend to warn their hosts, or whether their natural shyness indirectly causes the alarm. Surely among herds of cattle they become so tame that they can be approached without trouble.

No cow-herons (*Bubulcus ibis*) were seen with white rhinoceros in the Uele, though Roosevelt reports them in numbers near the Nile.

Fly Enemies

Some might think that horseflies (*Haematopota* and other Tabanids) find the hide of the white rhinoceros too thick, but another, really minute, blood-sucking fly (*Lyperosia*) is a characteristic companion, constantly hovering in great swarms about their huge prey. Their presence often indicated to us the proximity of a sleeping herd before we could actually see it. In such cases we listened for the usual noises that denote their exact whereabouts. And even while we halted, other tiny flies, which never attack the healthy human skin, gathered upon wounds or small scratches, and their bites always produced an infection which retarded healing. On careful inspection it became apparent that the hides of rhinoceroses have thousands of little injuries whose exudations furnish ample nourishment for these insects.

More remarkable still is an œstrid fly (*Gyrostigma pavesii*), whose grub-like larvæ often cover large portions of the stomach lining, just as those of other species do in zebras. According to Dr. Rodhain's investigations,* this large, beautiful fly, whose entire life history is intimately connected with the white rhinoceros, fixes its eggs upon the skin of the head, neck, and shoulder of its host. The young larvæ after escaping from the egg probably crawl about, enter the mouth of the rhinoceros, and reach its stomach, where they remain throughout their successive stages. Final transformation into the imago is attained when together with the excrement they leave the body and burrow into the ground to pupate.

Internal Parasites

Intestinal parasites, especially round worms (nematodes) are numerous, and most noteworthy is a broadened, rather short tape worm (*Taenia*). The large numbers of these parasites are astonishing, yet they seem to be rather a sign of good health, instead of a serious plague.

Use of Horns and Hide

What has indirectly contributed more than anything else to the gradual extermination of the white rhinoceros are the horns, a dusky inconspicuous mass, and a relatively insignificant part of the bulky brute. They made the horn-bearer a danger, and the horns could be sold. Greek and Hindu traders were ready to buy them at the value of ivory which has proven so fatal to the elephant. Superstitions of peoples in far off Asia made a market for horns, at good prices. Greasy and sleek humanity, rudely cursing or suavely smiling, has been willing to guarantee health to those stolidly believing, so long as the mere powder and scrapings from rhino horns sufficed. The craze among native chiefs to own a horn staff of unsurpassed length helped decimate the white rhinoceroses in South Africa.

White man, too, has bid for these rarities, and not in vain. Polished and shaped into canes, gold-topped and diamond encrusted, these horns become valuable "curios." Amulets to keep away witchcraft were carved easily, and worn willingly. A cup turned out of rhinoceros horn was believed to splinter at the mere touch of obscure poison, and insured carousals their unchallenged happy-go-lucky strain. Now statuettes and other bric-a-brac, fashioned by

* Rodhain, J. and Bequaert, J. Bull. Biolog. France et Belgique, LII, 4, 1919, pp. 379-465, Pl. III.

artists of many lands, still delight those eager for quaint trinkets.

The many-thonged slave-trader's lash cut out of rhinoceros hide now finds its counterpart in the dainty horse-whip of the more refined. The hide, raw or burnished, or given an amber-like appearance and polish, is often transformed into queer-looking tables, trays, and smaller objects. Thus it adds to the pride of the home owned by men of the colonial set. And finally, industry has found that disks cut from the hide and put on the lathe give a high polish and stand great wear.

HIDE OF RECORD BULL RHINOCEROS

When first stripped from the carcass the heavy skin needed about twenty porters to move it, but after sixteen hours of scraping and paring, and as finally dried and packed, it weighed only 65 pounds and was carried by one native.

Changes to be Expected

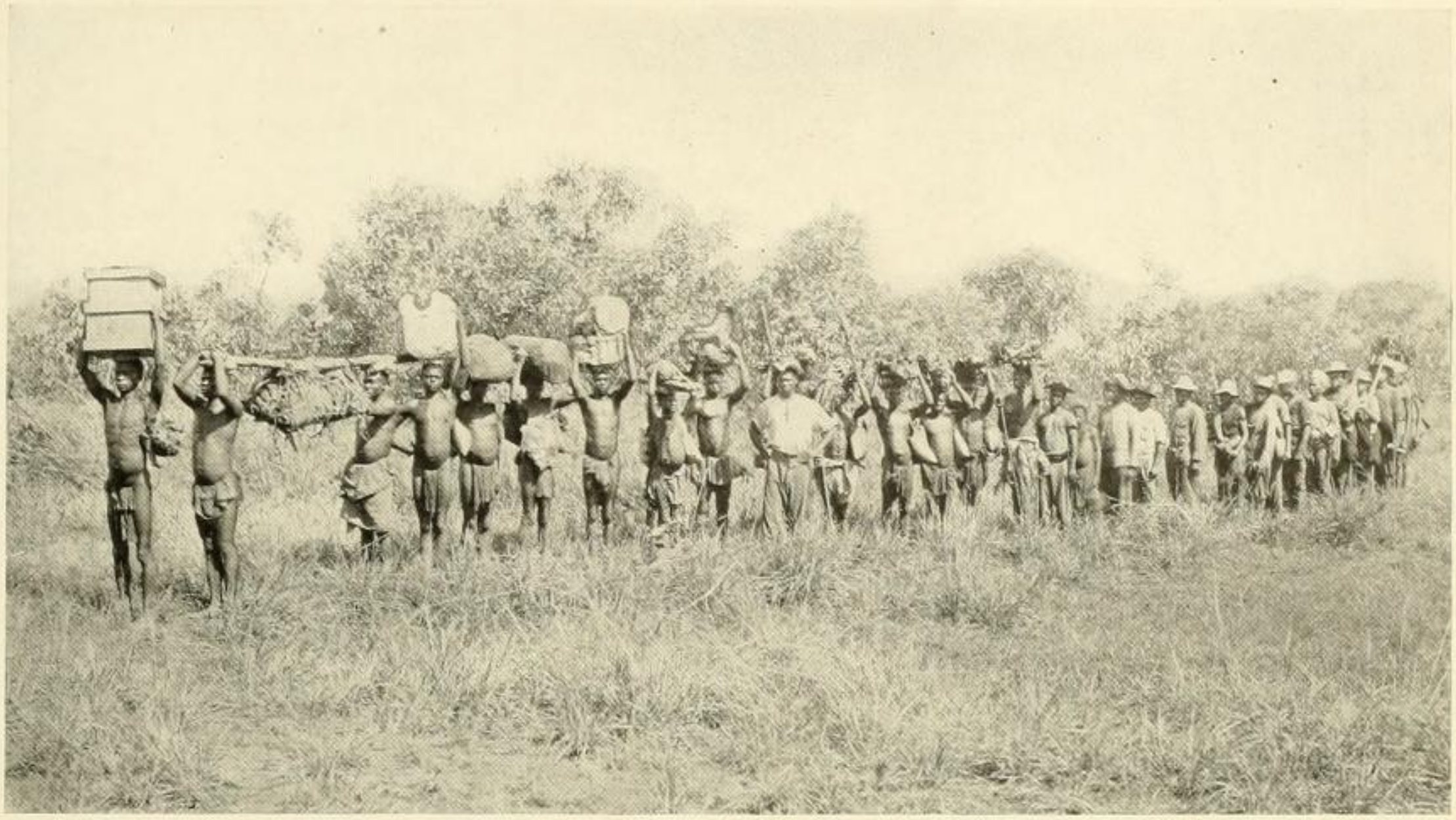
In young countries like Africa we must expect rapid changes in economic aspects. The natural paradises of game now seem to vanish as fast and as surely as the buffalo from the wide plains of America. Greed for lucre, the facilities of travel, perfection in firearms, alleged necessity, all have played their parts. At first caravans helped the slave-trader and the missionary, the trader and the sportsman. Oxcarts and railroads brought the settler, and his industries. Today automobiles are displacing oxen and horses. Chances for the game become slighter, and the difficulties for those who try to protect it greater. The countless herds are fast losing their heritage. Great game reserves have been set aside throughout the "Dark Continent," and the laws of various governments guarantee to the teeming multitudes freedom unharassed. At times clamoring settlers and prospectors with their following enter. Economic stress tightens the purse strings of colonial administrations; restrictions are lessened,—and all hope for the game is gone. The elephants of the Addo Bush furnish proof of this in their last stronghold in southernmost Africa. The huge beasts could not be corralled nor controlled. They simply had to go.

Game Protection Now Necessary

Fortunately the white rhinoceroses of the Congo-Nile race have little of the aggressiveness that makes the black form so dangerous a brute. Their realm lies far remote from civilization, and they leisurely roam over regions wherein

THE USUAL FATE OF A RHINOCEROS

Rhinoceros meat, and also the thick hide, is cut in strips a few inches thick and thrown across a hastily constructed rack. The fire and smoke, together with the heat of the sun, transform the dried flesh into a staple food for the natives.



SUCCESSFUL RETURN TO HEADQUARTERS

Small caravans were used for many side trips made during the Congo Expedition. On this occasion we secured, in addition to skin and skeleton, the first plaster cast ever taken of the muzzle of a white rhinoceros (carried by porter fourth from left), a valuable aid to the correct mounting of specimens for the Museum's habitat group. In the foreground an ideal pasture for these broad-mouthed monsters.

the call of forward struggling civilization is still faint. They are protected by the natural indolence of natives, and the commercial poverty of nature They have a fair chance to survive the native spear, but not modern gun and powder, and today the negro marvels at the small bullet that brings him so easy and big an exchange in meat

Number of White Rhinoceroses

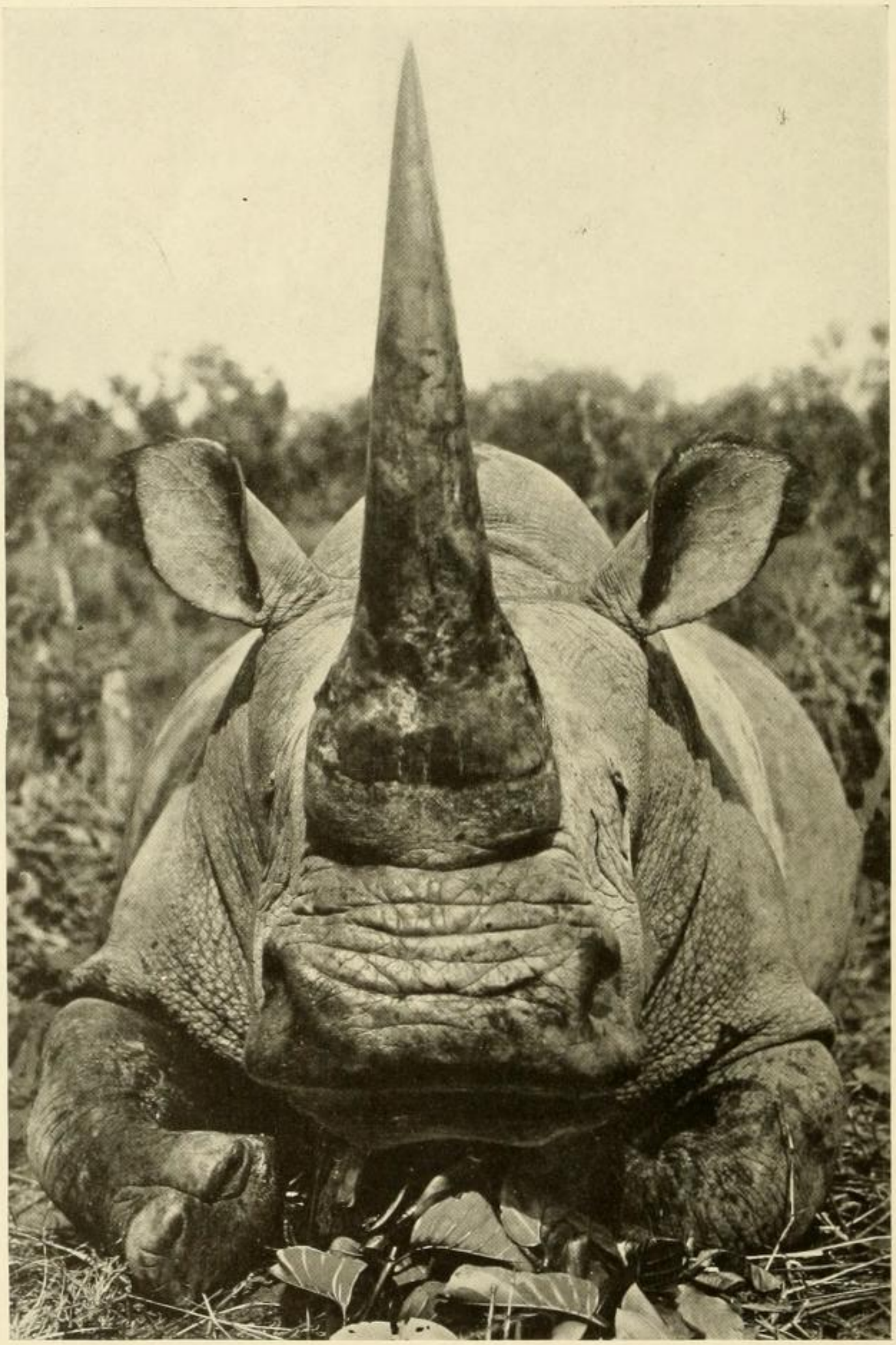
Judging from observations made by others and ourselves, from 2000 to 3000 white rhinoceroses may still be alive in the entire northern range. Just how rapidly their numbers will decrease, depends upon the protection afforded them. Their fate now lies in the hands of three Colonial Administrations: the northeastern Uele district of the Belgian Congo, the adjoining portion of French West Africa, and the Anglo-Egyptian Sudan. Perhaps complete restrictions to traffic in the horns of white rhinoceroses would be the most important step toward saving from extinction one of the few huge beasts dating back to Pleistocene times.

According to Colonel Roosevelt "the white rhinoceros is, next to the elephant, the largest of existing" land mammals. Among living giants it is the only one that has been considered extinct, the only one never brought alive to civilized countries. In Museum collections mounted specimens are still scarcer than of the rare okapi, which thanks to the remarkable pluck of a Belgian woman, Mrs. Landeghem, recently reached Antwerp alive.

Capture Live Specimen for New York

Is any American sportsman willing to help capture so coveted a prize? Or will any one be so generous as to enable the New York Zoological Society to be the first to exhibit a monster that has successfully daunted skill and courage? It would be a fitting and well deserved triumph for one of America's leading institutions, which, backed by keen enterprising spirit, has aroused the admiration and envy of century-old competitors abroad. Fortunately rhinoceroses in captivity have proved to be among the longest-lived creatures in the world. For half a century a white rhinoceros might interest the millions of New York city.

The Nile route is open. December to June is the best season. Six months of sport and adventure might bring crowning success. Shall America be first?



THE MONARCH OF THE JUNGLE

In the prime of life the conical shape of the front horn is typical, but with age it becomes worn near the base. Photographed in the pose the white rhinoceros usually assumes when at rest.