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The past and present distribution of some African ungulates

By

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PART 2

Order : PERISSODACTYLA

Family : RHINOCEROTIDAE

Genera : *Ceratotherium, Diceros*

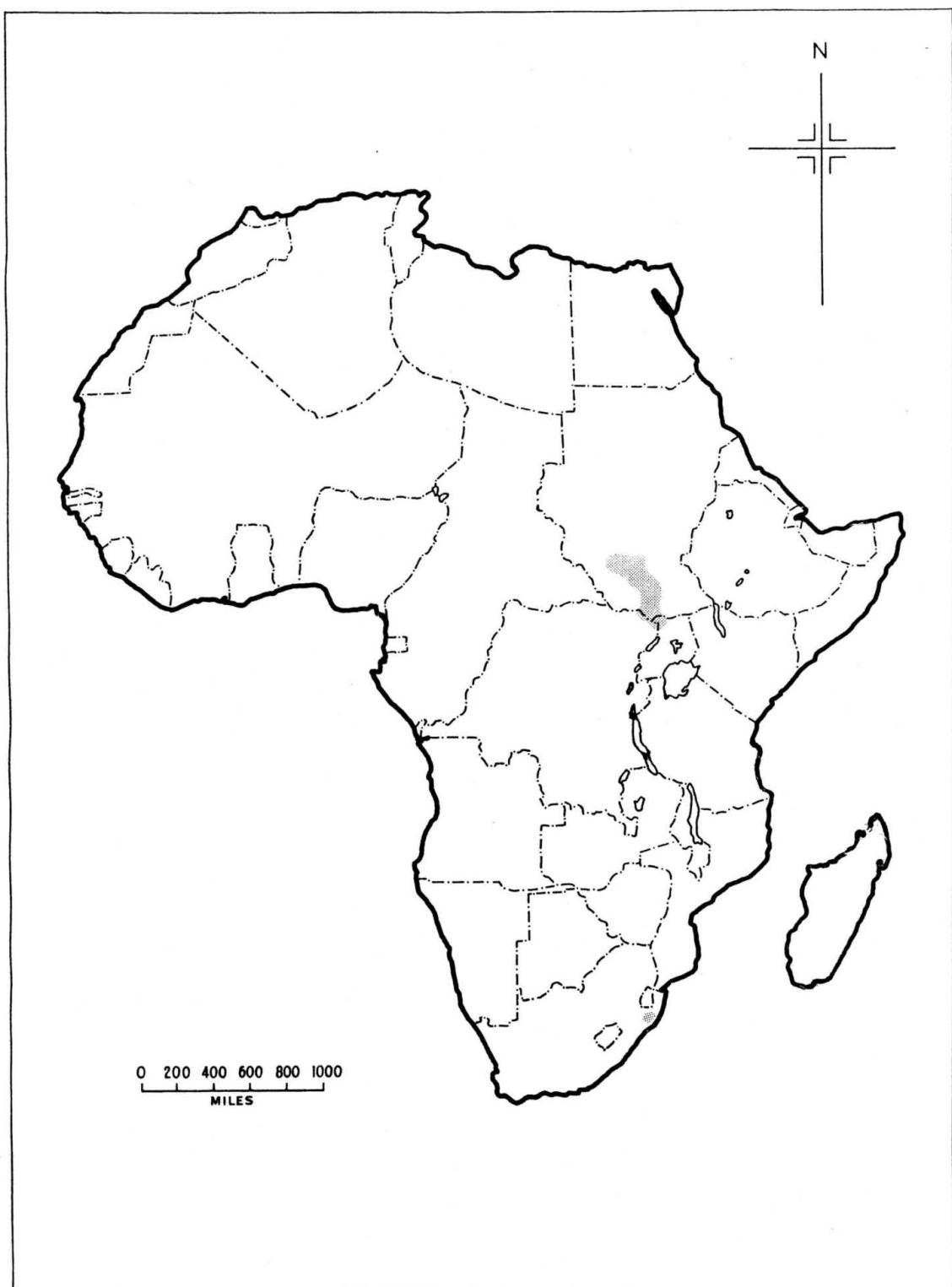
RHINOCEROSES

Two species of rhinoceros occur in Africa, the common "black", "hook-lipped" or "prehensile-lipped" rhinoceros, *Diceros bicornis*, and the rare "white", "square-lipped" rhinoceros, *Ceratotherium simum*. The terms "black" and "white" rhinoceros are misnomers since both animals are grey in colour. However, since these names are widely used and understood and are less cumbersome than other names, they have been used in this survey. The two species differ in anatomy, habitat and behaviour, and are only similar in being rhinoceroses with two horns. The adult White rhinoceros is a very much larger animal than the black and in fact is the second largest land mammal in the world. It is not usually aggressive and provided that the wind is right, it is possible to approach to within a few yards of a group of White rhinoceroses. Should they scent danger, their panic reaction is to run blindly away. If this happens to be in your direction, a clap of the hands and a shout is usually sufficient for the White rhinoceros to locate the danger and run in an opposite direction. The Black rhinoceros, however, is an aggressive animal and can only be approached with caution. Once it has located danger, it usually turns to face it and very often, without provocation, will charge. The result of this difference in behaviour towards man has been that the range of the White rhinoceros has been reduced considerably whereas the Black rhinoceros is still fairly widespread. The Asian belief in the aphrodisiac properties of the horn of the rhinoceros has led to a high market price for rhino horn, and a consequent high rate of poaching inside and outside reserves. The two species are dissimilar in the shape of body, the structure of the head, the shape of the mouth, the ears, the shoulders and the position of the legs, and can therefore be distinguished easily in the field. Photographs of both species (Figs. 9 & 11) show most of these features. The most important distinguishing features—the square lips of the White rhinoceros and the prehensile lip of the Black rhinoceros, are adaptations to their differing modes of life. The White rhinoceros is a grazer, eating short grasses up to a height of not more than four inches : on the other hand, the Black rhinoceros is essentially a browser, and although it may be seen eating grass on occasion, its diet consists mainly of leaves and shoots of bushes and trees. The two species thus occupy different ecological niches, and although they may live in the same area, as for example in the Hluhluwe Game Reserve in Natal, they do not compete for food and are seldom if ever seen together. In Hluhluwe Game Reserve the Black rhinoceroses tend to occur in the wooded areas, whilst the White rhinoceroses are in the more open bush savannah or open savannah.

The distribution of the two species is considered below in two sections. The first section deals with the White rhinoceros, *Ceratotherium simum* and the second with the Black rhinoceros, *Diceros bicornis*.

***Ceratotherium simum* (Burchell). African White Rhinoceros**

There are two subspecies of the Square-lipped, or White, rhinoceros in Africa. The northern race, *Ceratotherium simum cottoni* (Lydekker) is confined to a comparatively small area stretching from the West Nile District of Uganda, through the Lado Enclave and the Uele district of the Belgian Congo, to the Bahr-el-Ghazal district of the Sudan. The southern race, *Ceratotherium simum simum* (Burchell) is restricted to a very small protected area in Zululand.



Map 12. Distribution of White rhinoceros, *Ceratotherium simum*.

***Ceratotherium simum cottoni* (Lydekker).** White Rhinoceros (northern race) (Fig. 9)

The occurrence of this northern race was only confirmed at the beginning of the present century by Sclater in 1900, when he exhibited the front horn of a White rhinoceros shot by Major Gibbons near Lado on the White Nile (Sclater 1900, p.949 and 1903, p.194). On investigation, it was found that at that time the range of this species stretched from its most southerly point in the Wadelai region of north-western Uganda, northwards along the western bank of the Albert Nile, through the Lado Enclave up to Shambe (Selous). It then passed in a north-westerly direction through the Bahr-el-Ghazal drainage past Gogrial and Aweil to the borders of Chad. Here it was found near Goz Beida, and in the region of Abecher, where Babault in 1927 saw many horns which had been collected in the course of a year (Harper 1945, p.410). According to Lavauden (1932, p.510) a rhinoceros horn in the Marseilles Museum, labelled as a black rhinoceros, actually was from a White rhinoceros. Its origin was described as Tchad. The White rhinoceros was fairly numerous in the upper waters of the Bahr Azoum and the Bahr Aouk from whence it ranged into the Oubangui-Chari. It was fairly plentiful in the Birao area which is now a protected region, the Gos Sassulko National Park. Passing southwards again, a certain number still remained in French territory close to the Sudan border. Finally, in Belgian territory, north of the Uele river, the White rhinoceros was fairly numerous, especially in the region of Gangala na Bodio. Part of this region is now included in the Parc National de la Garamba.

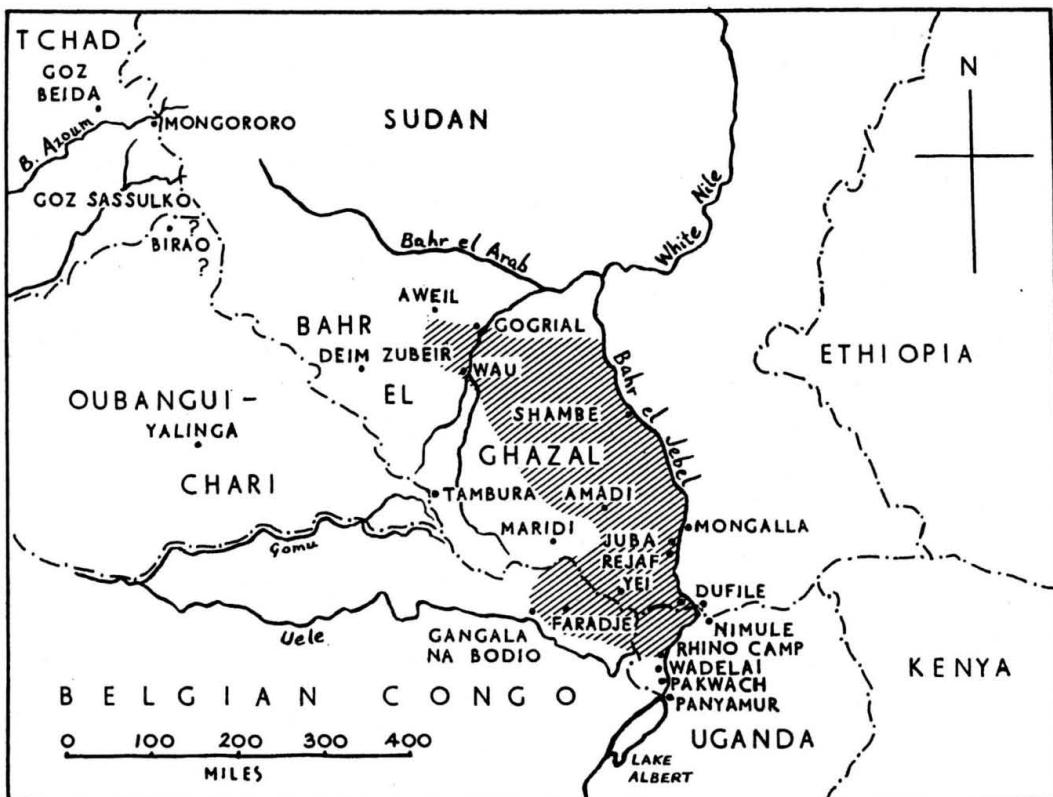
The White rhinoceros was not found distributed equally throughout the regions described above. In fact it occurred only in certain localities. Powell-Cotton gave the extreme southern limit of its distribution as the Ora River which enters the Nile opposite Wadelai. A few miles north of Wadelai, Stigand (1909) also found White rhinoceroses. He wrote that he had never seen them more than two or three days' journey inland from the Nile, upon which they appeared to depend for their water supply. A little further north following the Albert Nile, they were found twelve miles west of Rhino Camp by Roosevelt, who wrote that they were abundant there. In one day's march he saw nine, and a few days later Roosevelt encountered ten in the same general region. Berger in 1910 shot them in the neighbouring Orra Swamp.

North of Rhino Camp, they were not found again for some hundred miles until the stations of Lado, Mongalla, Kevi, Fariala and Kiro were reached. Here again they were relatively numerous. For a time the most northern locality known was Kiro, but Selous found evidence of their occurrence a day's journey west of Shambe on the Nile. In 1904, Powell-Cotton made a journey from Kiro southwards along the entire west bank of the Nile to Lake Albert, but he met the White rhinoceros only near Kiro, Kevi and Fariala, all localities in the vicinity of Mount Lado, and near Lenaisi and Rhino Camp. Searching further inland from the Nile, Powell-Cotton explored the Kaya river and the plateau of Kajo-Kaji, but found the country waterless and there was no evidence of the presence of rhinoceroses. Further west in the Lado Enclave, Boyd Alexander explored the Yei river country between Dar Fertit and Lado, but he also was unable to find rhinoceros tracks. However, in 1903, Scherren (see Schouteden 1911, p.119) claimed to have found the White rhinoceros common in the area north of the Congo (Lado territory) and in neighbouring parts of the Sudan.

The country between Shambe on the Nile and the Dar Fertit region of Bahr-el-Ghazal contained very few White rhinoceroses. In fact, Chapman (1921, p.409) wrote that during his trek right across the Bahr-el-Ghazal Province in 1913, he saw only three, but records (p.290) that, two hours west of Rejaf Koppie at the parting of the Nile and Congo, there is a region which is known as a haunt of White rhinoceroses. Blaine, whilst travelling from Wau to Dem Zobeir, found occasional spoor but never actually saw a White rhinoceros. Mahon, however, shot one in the Dar Fertit country near the head-waters of the Bahr-el-Ghazal drainage. Passing further west, White rhinoceroses were still found fifty years ago in French territory. In 1927, it was affirmed by La Commission Supérieure de la Chasse that there were no longer any White rhinoceroses in French Africa, but Lavauden (1934, p.430) wrote that this was a complete error because at that time they still existed in French Equatorial Africa from the region of Goz-Beida and Mongororo, south to Zemio, passing a little to the west of Yalinga.

South-east of Zemio, near Gangala na Bodio, in the Uele district of the Belgian Congo, the White rhinoceros was again found to be relatively numerous. This area was later to become the Parc National de la Garamba which is today one of the most valuable sanctuaries for the White rhinoceros.

The creation of reserves and national parks together with the complete protection from hunting afforded to these animals during the past fifty years has, with the exception of the French territories, allowed the White rhinoceros to retain its precarious foothold in the countries mentioned above. Indeed, its numbers have increased in the Belgian and British territories. The range of this species is illustrated in Map 13.



Map 13. Distribution of White rhinoceros, *Ceratotherium simum cottoni* (northern race).

French Equatorial Africa

In the French territories the task of protecting the White rhinoceros was attempted too late. Malbrant (1952, p.29), Blancou (1952, p.16) and Harper (1945, p.410) agree that White rhinoceroses are no longer to be found in Chad territory. Jeannin (1951, p.124) writes that 'in Chad' the Goz Sassulko National Park harbours 80. However, this Park is in the north-eastern corner of Oubangui-Chari Province and not in Chad. Therefore, if any White rhinoceroses are to be found in Chad, they will be either wanderers from the Goz Sassulko National Park or there is a very small chance that a few may still survive in the southern, central region, notably near Lake Iro (Blancou). There is no news of those that were living once on the Salamat river, and it is very probable that these have all been exterminated.

In Oubangui-Chari, as mentioned above, approximately 80 rhinoceroses survive in the Goz Sassulko National Park. However, neither Malbrant nor Blancou refer to any White rhinoceroses in this Park. Blancou (1948, p.10) made a tour of two months from May to July, 1939, across the regions that it once inhabited, i.e., the upper basin of the Aouk : Gounda, Vakaga, Ouandjia, Yata, Bahr Hadjer, Bahr Oulou, Bahr Kamer, Aoukale, and was convinced that it had been

exterminated there recently. This extermination he blames on the Africans, certain Europeans (including military personnel) but above all on the Levantine merchants. Dr Gromier, who crossed the same region at the end of the same year, was convinced that the rhinoceroses of the Vakaga region were all *Diceros* and that none were *Ceratotherium*. Now the Vakaga river is situated not far from the borders of the Goz Sassulko National Park, and it is possible that those in the Park are also *Diceros*.

Blancou writes that the last survivors in French Equatorial Africa were probably shot about 1935, but he suggests (as does Bourgoin (1955, p.65)) that there is a feeble chance that a few survive in the extreme east of Oubangui-Chari along the Sudanese frontier near the sources of the Kotto river and its tributary on the left bank, the Va river, from 8°30'N. towards the south.

Belgian Congo

The White rhinoceros is found only in the north-east of the Belgian Congo in the north of the Uele district where the Parc National de la Garamba is an excellent White rhinoceros reserve (Frechkop 1947, p.45 and Institut des Parcs nationaux du Congo belge 1955, p.63). At a count made in 1958 of White rhinoceroses in the Parc National de la Garamba, it was found that their number had increased to just over 1,000, viz. 1,081 (M. Micha, personal communication). They are found throughout the Park, but are densest in the north-eastern and south-eastern corners, usually in the open areas where there are few trees. In the north-west (west of the source of the Aka) they are much less abundant (Verschuren 1958, p.131). The pressure of the human population against the western and south-western boundaries of the Park is high, whereas to the north-east and east there are very few people living immediately outside the Park. The present rhinoceros population of approximately 1,000 has increased during the past ten years from less than 400 estimated by Offerman (1952, p.227) in the early 1950s. Since the Parc National de la Garamba is the only reserve in which the northern race of the White rhinoceros is adequately protected, the future of this Reserve is vital to the survival of this northern race, in the same way as the Umfolozi Reserve in Natal is the last hope for the survival of the southern race of White rhinoceros. Schouteden (1946, p.263) illustrates the distribution of rhinoceroses in the Belgian Congo by a map, and remarks that they are found by swampy land. Schouteden gives the following list of places where the White rhinoceros has been recorded : "R. Gangu west of Kassima, also next to the town of Bele west of Azangor, etc. Before 1914, it was common in the north-east corner of the Colony and extraordinarily plentiful near the Sudan. Scops mentioned it near Dolo on the British border, 1½ hours north of Mahagi.

Uele District—Mbomu, Rafai (de la Kethulle), 'Uele' (Lefranc), and Dungu (Hutereau).

Kibali-Ituri District—Faradje (de Callone), source of the Garamba river (Lebrun), N. E. Uele (Fraipont), N. E. Congo (Pilette). It occurred in the region of Doruma (and perhaps even Rafai) up to the Sudan frontier towards Aba. Its range then descended towards Lake Albert, but it did not reach it" (Schouteden 1927, p.28).

Sudan

The White rhinoceros, as stated above, was found at the beginning of this century in certain, very local, habitats. In these, the largest numbers were found in the Lado Enclave and the northern and western regions of Bahr-el-Ghazal Province. These animals were much persecuted, and Christy (1924, p.152) records that comparatively few individuals survived then in the Sudan. He estimated that those along the left bank of the Bahr-el-Jebel Nile were very rare and could scarcely exceed a score (also Stevenson-Hamilton 1919, p.348 and Trouessart 1909, p.199). Further west, along the Nile-Congo divide from about Yei in western Lado to a point in the Bahr-el-Ghazal some distance north-west of Tembura, they were more numerous. In the Meridi and Yambio district in 1916 Christy often saw them during long treks in the bush. On the Congo side of the Divide, up to and beyond the Franco-Belgian boundary at the Mbomu river, he found rhinoceroses much more common than anywhere on the British side. In 1931, Brocklehurst (p.108) was able to write that, owing to their strict preservation, White rhinoceroses were on the increase.

In one year, in Mongalla Province he saw no less than eight cows accompanied by calves. Today, the White rhinoceros still occurs from the Nile to the French Sudan border (Anon. 1946, p.35). They are found on both sides of the Yei-Meridi road especially to the north of Lantito. In Reid's opinion (1952, p.32) there are between 400 and 500 rhinoceroses in Yei district, the heaviest concentrations being probably in the South (Anon. 1952, p.187). They frequent the small drainage lines on the ridges and the larger valleys where tall *Pennisetum* grass grows often.

In 1953, Col. A. Forbes wrote (personal communication) that the White rhinoceros was still fairly widely distributed from the Uganda border up to the Bahr-el-Arab and as far west as Wau. An estimate of the numbers in the Sudan at that time was approximately 1,000 ; this number was thought to be increasing annually. Since the Sudan became self-governing, and the Game Department came under Sudanese leadership, little information about the present status of the White rhinoceros in the Sudan has been made available, and its future is therefore very uncertain. In common with all other African game departments, the Sudanese department is short of money and is therefore unable to give complete protection to the White rhinoceros. It is very probable that the 1,000 estimated by Colonel Forbes has now been reduced, and that the animal should be described as very scarce to the west of the Nile in Equatoria and Bahr-el-Ghazal Provinces.

Uganda

In 1925, 1926 and 1928, attempts were made to take a census of the number of White rhinoceroses in Uganda. These censuses showed that there had been a decrease of 20 in the figure (approximately 150) for the earlier years compared with that for 1928 (Pitman 1931, p.1). In the 1925 census it was found that the animals in the West Madi region, which adjoins the Sudan, were exceptionally nervous and timid, but that in the 1928 census, they appeared to be very peaceful and tame in the same locality, thus showing that they had been relatively unmolested. Another census made in 1939 by Captain Salmon (1939, p.10) showed that as far as numbers were concerned, there was a 50 per cent increase over the previous investigation made in 1928, but that unfortunately the organised hunts which had swept the country during the dry season had changed the placid rhinoceros back into a timid, suspicious creature. The White rhinoceros was found throughout West Madi, and in a greater part of the West Nile district, its range extending from the Sudan border in the north, to Pakwach and Panyamur in the south. The percentage of young was generally satisfactory, but in the more southern portions of its habitat, where innumerable spiked and leather thong foot traps were found, scarcely a young one was seen. In the vicinity of Rhino Camp, a distinct lessening in the rhinoceros population was found, but this was undoubtedly due to greatly increased native settlement which was encroaching heavily on the rhinoceros areas. In contrast however, in other localities considerable increases were apparent, and in some places where this animal was a rarity years ago, there were now well-established colonies. In the Koich river area, this increase was particularly noticeable.

During the past twenty years up to the present day, the White rhinoceroses, due to strict protection, have increased in number by at least 50 per cent. According to Pitman, during the past twenty-five years their numbers have doubled, and perhaps trebled. Today, estimates show that they now exceed 300 in the West Nile and West Madi districts, whilst some observers consider that 500 is nearer the true total (also Report 1953b, p.40). The Conservator of Forests (Pitman 1949, p.21) suggests that there are probably more White rhinoceroses in the Era Crown Forest Reserve in West Madi than in both the Kei and Otze Forest Reserves combined (Report 1956, p.40). In 1949, Pitman (1950b, p.5) estimated that there were two dozen living in the Mount Kei Crown Forest Reserve in Aringa country of the Lugbara. A report from an assistant Game Warden in 1947 from the southern Sudan (Pitman 1949, p.21) records that there were about 50 White rhinoceroses in the narrow Sudan strip, thirty miles long by two miles broad, between the Uganda border and the left bank of the Nile. Further, he estimated that there were at least 200 in the White rhinoceros habitat north of West Madi (this includes the Nile strip previously mentioned). In 1949 (Pitman 1950, p.26) a survey carried out by a Game Ranger in West Madi and the northern

part of West Nile district as far south as the Arua-Rhino Camp road indicated a total of between 150 and 200, made up approximately as follows :—

West Madi

Metu-Dufile-Leya Valley area	30
Kale-Waka-Liwa area	70
Laufori-Moyo area	25

West Nile

Aringa country : Kei-Midigo area	25
Balala swamp : Bulakatoni-Rhino Camp-Rigbo	20
Various places : individuals and small groups	20
Total	190

In 1957, J. B. Heppes estimated that the total Uganda population of White rhinoceroses was 335 and described their distribution in West Nile as follows :

North of the Laropi-Moyo road and east of the Moyo-Kajo Kaji road	30
North of the Moyo-Arua road and east of the Nyawa river	15
North of the Moyo-Yumbe-Koboko road and west of the Nyawa river (Kei 8, Midigo 5, near Nyawa 17)	30
South of the Laropi-Moyo-Arua road and north of the Nyawa river (Palorinya 50, Rede 25, Laufori 10)	85
South of the Nyawa river and north of the Obongi-Wolo road and east of the Wolo-Yumbe road....	100
South of the Obongi-Wolo road and north of the Rhino Camp-Arua road and east of Yumbe-Arua road	20
South of the Rhino Camp-Arua road and north of the Ora river (Inde 30, others 15)	45
South of the Ora river and other areas	10
Total	335

During a three days' tour at the end of May, 1949, an administrative officer in the Kale-Waka-Liwa area saw at least twenty family groups. In the Laufori-Waka area they were particularly numerous (Rep. Game Dep. Uganda 1950, 1951b).

The Game Department Report for 1953 (Report, 1954c, p.46) stated that the White rhinoceros continued to flourish in the Mount Kei and Mount Otze Sanctuaries. In the latter Sanctuary the rhinoceroses roamed between Madi and the Nimule Game Reserve, and they were also reported from outside these Reserves. A Game Ranger reported that he had seen more rhinoceroses in the Era Crown Forest Reserve than elsewhere, and they liked the Kali region. He added that, up to the end of August, White rhinoceroses could always be seen along the track leading southwards from Laufori on the main road north of Moyo. During September, however, these rhinoceroses moved further east, possibly due to increased settlement in the Laufori area.

The Game Department Report for the eighteen months from the 1st January, 1954 (Report 1956, p.34) states that the Mount Kei Sanctuary contained very few White rhinoceroses. In the past this Sanctuary had suffered considerably from poachers operating from the southern Sudan. In Mount Otze Sanctuary, White rhinoceroses were confined to the central, northern and north-eastern sections. In the Ogoko area of West Nile, the White rhinoceroses were dying out. This area was one of the most heavily poached in West Nile and White rhinoceroses suffered more than other mammals (p.39). The main concentrations of White rhinoceroses were found in the Kali Obongi area of West Madi. In West Nile they were found in small numbers on the west bank of the Nile, north of the Ora river. In the Ogoko area there were few left, due mainly to the activities of poachers. Between Rhino Camp and Obongi they were more numerous, but nowhere plentiful.

In the Game Department Report for the eighteen months commencing the 1st January, 1955 (Report 1957, p.43) it was noted that very few White rhinoceroses were actually found in the two

sanctuaries allocated to them. In the Inde area they were once again on the increase but had not yet recovered from the heavy poaching setback in 1954. The main White rhinoceros concentration was in the Palorinya-Itula-Lumunga-Kali area of West Madi, where there was more than half of the total population of the West Nile Range. There were estimated to be approximately 350 White rhinoceroses in Uganda (1955), with good indications of yearly increases. With the exception of the Mount Kei area, numerous young were seen in all rhinoceros habitats during 1955.

The future of the northern race of White rhinoceroses in Uganda cannot be described as secure, since these animals are not protected in a National Park. Thus, as human cultivation and settlement expand, so will the rhinoceros habitat become more confined. The two sanctuaries set aside for the White rhinoceroses are in forested areas, and since these rhinoceroses inhabit open savannah country, these "sanctuaries" are obviously quite inadequate. Only reserves in true open "White rhinoceros country", well protected by patrols, will prevent the extinction of the White rhinoceros in Uganda. If such reserves are proclaimed, it is important that more than one should be set aside in order to prevent the extinction of the species in a possible epidemic.

***Ceratotherium simum simum* (Burchell). White Rhinoceros (southern race)**

A study of the biology and management of the southern Square-lipped, or White, rhinoceros *Ceratotherium simum simum*, has been made in Zululand by I. C. Player and J. M. Feely. Their findings are recorded in a paper for the Natal Department of Wild Life Conservation. They report on the past and present distribution of the White rhinoceros in South Africa and describe the habitat and behaviour of this species in the Umfolozi Reserve.

The southern White rhinoceros prefers a habitat in which there is a suitable short grassland; a continuous water supply; a certain amount of bush cover needed for resting and for protection whilst giving birth to young; and a rolling, open country which is not too hilly. Player and Feely describe the grasses of the White rhinoceros habitat, which are often dominated by *Themeda triandra*. The latter grass is not particularly favoured by the rhinoceros unless it is newly sprouting after burning, and it appears that the principal food species are *Panicum maximum*, *Urochloa mossambicensis* and *Digitaria* sp. Both *Panicum* and *Urochloa* species are shade tolerant and occur early in the plant succession, and assume dominance in many areas where the *Themeda* has been precluded by trees, or in disturbed areas such as termite mounds, antbear holes and closely grazed areas. White rhinoceroses probably drink about once every twenty-four hours, usually after dark. The excretion of faecal material is usually on one of the very large dung heaps that are found in their habitat, some of which have been used for a long time. Smaller ones are found in the restricted localities where rhinoceroses have a good food supply lasting for varying periods. Player and Feely knew of one such dung heap which was used by both the black and white species.

There does not seem to be a definite mating season for the White rhinoceros and the gestation period is approximately eighteen months (W. E. Foster). The time from parturition to the following impregnation is probably about two to two-and-a-half years, therefore the interval between the birth of each calf is some three-and-a-half to four years. This comparatively slow rate of reproduction is another reason for the reduction in number of the species, since it needs considerable time to recover from the depredations of poachers. It was estimated that 25 to 29 per cent of the total female population can be expected to produce young. The calf suckles for at least two years although it has been observed trying to graze when about one week old. Player and Feely discuss the management policy which should be adopted in a small reserve such as the Umfolozi. In order to maintain the natural environment in a condition as close as possible to the original wilderness, it is necessary (i) to restrict wandering by means of fencing; (ii) to provide adequate water; (iii) to maintain the natural grass pasture by use of controlled fire and prevent undue increase of other competitive species by control since they affect the natural grassland by trampling and grazing; (iv) to restrict disturbance. In the Umfolozi Reserve a wilderness area has been set up in which visitors enter only on horseback or on foot. There are no roads or man-made tracks to disturb the natural habitat. It is hoped that the lower disturbance factor in the wilderness area

will help to maintain the natural environment, thus beneficially affecting the White rhinoceros population, and also allowing visitors to see the game in the Reserve in a natural setting.

The White rhinoceros of South Africa has been saved from extinction during the past fifty years. In 1892, Nicolls & Eglington (p.62) wrote that there was every reason to suppose that it was then extinct. It had been observed frequenting a small district in north-eastern Mashonaland and had also been seen in the neighbourhood of the Sabi river where Kirby (1896, p.550) in 1895 found a cow and a calf in the Matamiri bush on the south bank. Bryden (1897, p.181) wrote that it was nearly extinct and that its last home was supposed to be in a corner of north-east Mashonaland. Bryden mentioned that at the end of 1894 a few were known in the low, inaccessible, tsetse-fly-haunted country between the lower courses of the Black and White Umfolozi rivers, Zululand. Selous (1890, p.191) in 1874 found White rhinoceroses fairly plentiful in the country to the south of Linyanti, on the Chobe river, whilst in 1879, during eight months hunting on and between the Botletlie, Mababe, Machabe, Sunta and upper Chobe rivers, he never saw any spoor of these animals and the Bushmen said that "they were finished". In 1878 and 1880, however, Selous still found them fairly numerous in a small tract of country in north-eastern Mashonaland, between the Umnati and Hanyane rivers, but he predicted their extermination within a very few years. In July, 1893, two adult bulls were shot in Mashonaland by R. C. Coryndon, and in 1894 six were killed in Zululand by a C. R. Varndell and a friend. In 1895 a bull was shot in north Mashonaland by Eyre, and in 1903 four individuals were still lingering near Lake Ngami. Before the outbreak of the war in 1899, only eleven were known to be alive—four in Zululand and seven near Ngami. At the turn of the century there were said to be about ten alive still in Zululand (Renshaw 1904, p.138). It was from this small nucleus, maybe under a dozen, that the survivors of today are descended. These survivors are nearly all now living in the Umfolozi Game Reserve and number about 500.

The recovery of the southern race was a gradual process and was hindered both by native and European poachers, and the low reproductive rate of the species. Thus in the 1920s only about 20 White rhinoceroses occurred in the game reserves of South Africa (Hobley 1926, p.44). Fitzsimons (1920, p.207) suggested that possibly one or two still lingered in the remoter parts of Southern Rhodesia. This was possibly true, but they are probably extinct there today (Hornaday 1922; Haagner 1920, p.124). In the 1930s these animals had increased in South Africa and in 1933, 134 were seen inside the Umfolozi Reserve and 72 outside it (Report 1935c, p.52). Du Plessis (1934) wrote that in the Umfolozi Reserve the Game Conservator estimated that there were 190 White rhinoceroses in the district, and that in the Hluhluwe Reserve there were 7. In 1936 (Report 1937c, p.51) there were said to be 20 or 30. In 1944 (see Fifth annual report of the Zululand Game Reserves and Parks Board for the year ending 31st March, 1944) the Game Conservator found 12 in the latter Reserve, in 1948, the same number (Anon. 1948, p.3) and in 1949, only 9 adults and one calf were found. In the third report of the Natal Parks, Game and Fish Preservation Board for the period 1st April, 1950 to 31st March, 1951, it was stated that there were 20 White rhinoceroses living in the Hluhluwe Reserve. Today there are only between 25 and 30 in the Hluhluwe Reserve (P. Potter, personal communication). The Umfolozi Reserve is the most valuable sanctuary of the White rhinoceros in South Africa. It is approximately 112 square miles in area and is important since it includes the natural habitat of the southern White rhinoceros and contains country in which the animal can breed freely in undisturbed surroundings (Attwell 1947, p.24). On occasions, however, such as during the dry, winter months when the rivers are low, the White rhinoceros crosses the Umfolozi rivers and causes damage to adjoining Crown lands and Native Reserves (Kluge 1950, p.154). Aerial spraying of D.D.T. has been used in the anti-nagana campaign in Zululand, during which a cursory count was made in October, 1948, from the air, which indicated that the total number of White rhinoceroses in the Umfolozi Reserve exceeded 300. After this, two organised counts were made and the possibilities of error diminished as far as possible. The first count was made between the 3rd and 9th November, 1948, and the number counted was 557. These animals were recorded as : adults of unknown sex—229, bulls—74, cows—40, young unidentified—30, big calves—55, small calves—59. (These figures are quoted from Kluge (1950, p.157), but he does not mention the other 70 required to make the total of

557!). A second count from the 7th to 14th December, 1948, was 554. These were recorded as follows : adults of unknown sex—101, cows—153, bulls—142, young unidentified—61, small calves—67, big calves—30. The small calves would be up to 18 months old, the big calves from about 18 months to 2½ years old, and the young from about 2½ to 4 years old. Aerial counts of White rhinoceroses in Zululand are now made annually, and these show that there are approximately 500 White rhinoceroses in Natal. Unfortunately, nearly half of this number live outside the Game Reserves, and although at the moment this is not a serious handicap to their conservation, there is a very real danger that some of the Crown Lands adjacent to the Umfolozi Reserve will be scheduled as Native Reserves, in which case the pressure of settlement will confine the rhinoceros to the Reserves, which are too small to maintain a large population. An aerial count in July, 1958, found only 179 White rhinoceroses within the Umfolozi Reserve, the rest of the population were in the southern buffer zone, the "corridor", the Crown Lands and the Native Reserves. There seems to have been an increase in numbers in the southern buffer zone and in the "corridor", as shown by comparison with a two-day count made in September, 1953 in which the total distribution of 437 White rhinoceroses was as follows (269 within the Reserve):

Western section of Umfolozi Reserve	236
Eastern section of Umfolozi Reserve	33
Eastern corridor	28
Southern Crown Lands	32
Western Crown Lands	56
Native Reserve No.11 (Melmoth)	37
Native Reserve No.12 (Nongoma)	15
	437

The 1958 concentration was found north-west of the 1953 concentration. These numbers are a remarkable increase on the possible dozen remaining at the beginning of this century, but the future is not assured for the present population, particularly since the pressure of settlement on the boundaries of Umfolozi Reserve is increasing, and since the all-important "corridor" between Umfolozi and Hluhluwe Reserves has not been added to the Reserves. The inclusion of the "corridor" into one large Reserve including the Umfolozi and Hluhluwe Reserves is imperative to the future of the southern race of the White rhinoceros. Without the corridor as part of the rhinoceros sanctuary, settlement increasing round the Umfolozi borders will force the rhinoceros to remain inside the Reserve, with a consequent reduction in numbers which in one unfavourable season, or by an epidemic, might be reduced below the survival rate of the species.

South West Africa

According to Dr R. C. Bigalke (personal communication), although the White rhinoceros appears on the list of protected game in South West Africa, it does not occur there. Barnard (1952, p.76) claims to have seen the Square-lipped rhinoceros between Otjikuvare and Otjovathandu, and remarks that the natives have always recognised two kinds of rhinoceros in the Kaokoveld and southern Angola ("Ongava Ondorozu" and "Espandangava"). He feels confident that time and a thorough investigation will prove the correctness of his assertion.

Angola

As in South West Africa, native reports describe two kinds of rhinoceros in Angola. Whether one is the White rhinoceros is uncertain. Dr D. F. Marais states that the new railway line to Mossamedes passes through an area frequented by these rhinoceroses.

Southern Rhodesia

The range of the White rhinoceros originally included Southern Rhodesia. Owing to the ease with which it was hunted it had been shot almost to extinction by the end of last century, although it was believed to exist still in north-eastern Mashonaland. Today it is considered extinct in this

territory by most authorities, although some feel that there is still the possibility of its survival in the uninhabited regions to the north-east of the territory. Natives of the Zambezi valley still recognise two distinct species of rhinoceros—one which inhabits the thick *jesse* bush and is a browser, and the other which is found in more open country and is a grazer. Unconfirmed reports from natives indicate that up to 6 of the latter species have been seen together. These reports all originate from the north-eastern corner of the colony lying between the Chewore and Angwa rivers in the Zambezi valley. This country is virtually unexplored and untouched and, together with land to the west, between the Chewore and Rekomitje rivers, contains one of the finest big-game concentrations, outside National Parks, in British Africa (A. Fraser, personal communication). The continued existence of the White rhinoceros in Southern Rhodesia is still possible, and this opinion is based on descriptions given by Europeans visiting the area. Until an exhaustive search is made in the area, there is a chance of a few White rhinoceroses surviving there and they should be found and protected as soon as possible. The species was said to be extinct in Mozambique, but that it was not extinct twenty years ago is shown by the photograph (Fig. 10) taken by a hunter in Mozambique and not far from the Southern Rhodesian border.

Mozambique

The White rhinoceros has been said to be extinct in Mozambique for some time (M. A. Andrade Silva, personal communication). However the photograph (Fig. 10) taken by Judge Beadle (Bulawayo, personal communication) was of a bull White rhinoceros shot in Portuguese East Africa about 1935. It was shot in an area midway between Gauveia and Marcorsa and the species was then apparently quite numerous, at least nineteen being seen in one day. It appeared to be more numerous than the Black rhinoceros which was living in the same area. Judge Beadle believed that the White rhinoceros occurred near Tega Kraal, about seven miles from Marcorsa and forty miles from Gauveia at the foothills of the Gorongosa Mountains. He was certain of his identification having compared the dead White rhinoceros with a Black rhinoceros which he killed on the same day.

***Diceros bicornis* (Linnaeus). Black Rhinoceros (Fig. 11)**

The Hook-lipped or Black rhinoceros is more widely distributed in Africa than the White rhinoceros. In South Africa it is confined to the national parks of Zululand, from whence its range passes northwards through Portuguese territory into Nyasaland and Northern Rhodesia. In Southern Rhodesia only a very few remain in the Wankie Game Reserve, because the majority have been slaughtered by hunters and in tsetse-fly control operations. Further north, the last strongholds of the Black rhinoceros are found in Tanganyika and Kenya Colony. In Ethiopia the rhinoceros is very scarce and is being poached out rapidly. Further west, a number are living in the Sudan and northern Uganda on the east bank of the Nile. In Belgian Congo the Black rhinoceros is found only in Katanga, although recently it has been reintroduced into the Parc National de la Kagera in Ruanda-Urundi. Its most westerly extension is in French Equatorial Africa in the Lake Chad region and a few are found in the north-eastern corner of Nigeria. There are no rhinoceroses in West Africa.

The range of the Black rhinoceros, therefore, covers a relatively large part of Africa, although it does not represent the distribution before Europeans entered the Continent. The Black rhinoceros is found either alone or in small family parties, unlike the White rhinoceros which tends to congregate in groups of about six or more. It is a more aggressive animal than the White rhinoceros, although not so large in body size. It is much persecuted for the sake of its horn which commands a high market price. Since these animals are creatures of habit, not moving far unless absolutely forced and tending to drink daily at the same place, they are easily poached. Apart from certain protected areas, the Black rhinoceros has become rare in very many areas where it was once common. However, during the past fifty years, although the numbers of Black rhinoceros have decreased in most areas, its general distribution has remained approximately the same.



Map 14. Distribution of Black rhinoceros, *Diceros bicornis*.

South Africa

The Black rhinoceros is found in three game reserves in South Africa, all in Natal, of which the Hluhluwe Reserve contains by far the greatest number—between 180 and 200 (P. Potter, personal communication). These Black rhinoceroses occur generally all over the Hluhluwe Game Reserve, tending to concentrate in the east and south-east, except for the forest areas. Umfolozi Reserve contains only about 13 (1958) and in the Mkuzi Reserve, according to the Warden, there may be about 50, although a count made in 1958 found only 27 in this Reserve.

In 1944, the Game Conservator estimated that Hluhluwe Reserve contained a minimum number of 150, and in 1949, Mr Potter (the Warden) believed that these had increased to at least 160 animals (Anon. 1950d, p.32). The third report of the Natal Parks, Game and Fish Preservation Board for the period 1st April, 1950 to 31st March, 1951, claimed that 190 Black and 20 White rhinoceroses were then living in the Hluhluwe Reserve. The other two Reserves, the Umfolozi and the Mkuzi, in comparison contain only a very small number of Black rhinoceroses (Attwell 1947, p.24). In Mkuzi Reserve there may be about 50, according to the Warden (Mr Denyer, personal communication). They are seen particularly along the Mkuzi river and in the eastern area of the Reserve. Calves are seen mainly in October and November, although no specific time has been noted. They are poached hardly at all in this Reserve, probably because the local Africans are superstitious about rhinoceroses. During the past three years (January 1959) only two rhinoceroses were known to have been snared. Kluge (1950, p.159), writing on "The White Rhinoceros of the Umfolozi Game Reserve" mentions that a few Black rhinoceroses exist in the Mona and Tobot-Gcoyi areas and that only two were recorded from the Munyana area in the Southern Crown Lands.

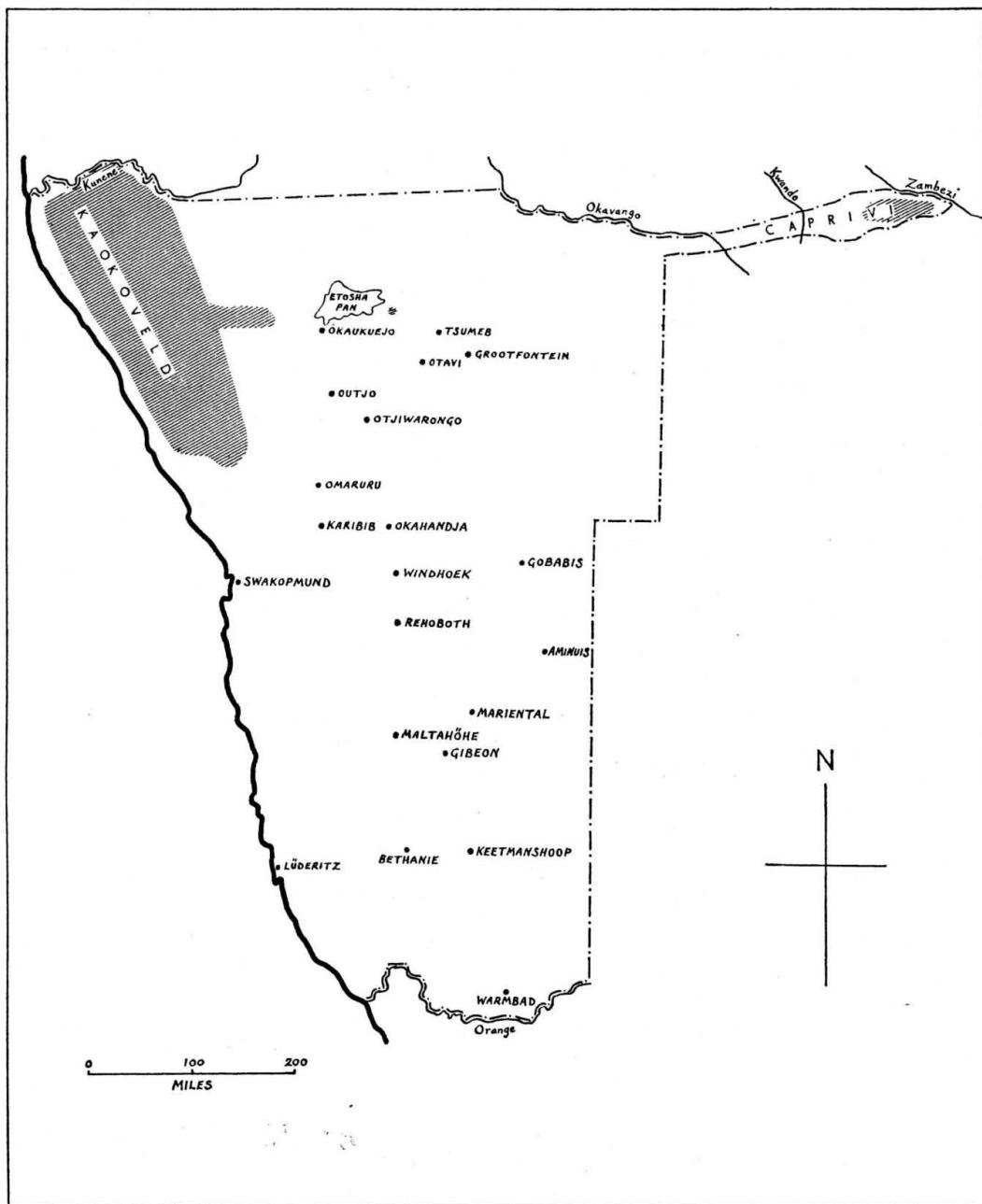
There are no Black rhinoceroses in the Kruger National Park although a few were known to exist in the Park some twenty years ago (Report 1936e, p.20). There has, however, been no authentic report of one being seen there since 1936, when Kirkman tracked one in the dense bush south of the Sabi river (Lownds 1952, p.54). Twelve years ago, Stevenson-Hamilton (1947, p.45) believed that a few rhinoceroses still existed in the dense thorn bush (about 100 square miles in area) in the lower Sabi region, where they remained hidden from humans, in the summer months, and probably wandered into Portuguese East Africa when the water-holes had dried up. Against this theory, Bigalke (1947, p.221) points out that neither rhinoceroses nor their tracks have been observed in the lower Sabi bush since 1938. Kirby (1896, p.550) believed that the last specimen of Black rhinoceros in the bush country to the west of the Limbobo and north of the Sabi, was shot on the Manunga river close to his old "Rhino Camp" in 1891.

At the beginning of this century, Kirby (Bryden 1899, p.38) wrote that probably not a dozen Black rhinoceroses were left in the north-eastern Transvaal. These animals, together with two or three in the Matamiri bush (which is now in the Kruger National Park) and a few in the Libombo Range near the Oliphant's river Poort were the only representatives of this species in South Africa. In 1925 a few were said to exist near the Shingwedzi river (Report 1927, p.63). They were strictly protected and very gradually began to recover. Thus in 1934, du Plessis estimated that the Hluhluwe Reserve contained 75 Black rhinoceroses, and in 1935, Barbour & Porter (p.28) gave the number as 90. Hobley (1926, pp. 44-45), however, put the numbers higher, e.g., 150 in the Hluhluwe Reserve, 30-50 in the Mkuzi Reserve and 2 or 3 in Umfolozi Reserve. Today, although the gradual increase has continued, the Black rhinoceros is still very rare in South Africa and is confined to Natal. The number of individuals in the Zululand reserves totals only about 250, being actually less than that of the white species (Stevenson-Hamilton 1947, p.45). However, this number is slowly increasing, and during the past twenty years of his stewardship, Mr H. B. Potter calculated that the Black rhinoceros has approximately doubled its numbers in the Hluhluwe Reserve.

Angola

The Black rhinoceros is found rarely in the southern regions of Angola (Hill & Carter 1941, p.148) and has been recorded at Curoca, Gambos, Mupa, Evale and Chitengue. It has disappeared from the Kuvangu, Kului and Dongo region (A. J. Duarte, personal communication). Monard (1935,

p.257) found it in three regions : the Chimporo where Hertig killed one in 1928, the Kafima region where its presence is confirmed by colonists and thirdly the Mui region to the west of Kuvelai. Bocage records it in the "mare meridionale" region, where Capello and Ivens also observed it. Monard believed that it probably existed in the region which stretched to the south between the Kuvangu and the Zambesi. Statham lists it from the following places—source of the Bero river, upper part of the Otyinjau and between this river and the Kakulovar, in the upper part of the Kuvangu, Kului and its tributaries towards Dongo, on the Kutyi, towards the Post of the same name, and in the extreme south-east of the colony. Marquardsen noticed it to the south of 13°S.



Map 15. Distribution of Black rhinoceros, *Diceros bicornis*, in South West Africa.

South West Africa

The Black rhinoceros occurs sparsely in South West Africa. It ranges throughout the Kaokoveld and occasionally into the Etosha Pan region. Recent (1948) estimates of the approximate number of rhinoceroses in the Kaokoveld would be approximately 200, and 30 in the Etosha Nature Reserve. Outside the latter reserve there are approximately 50.

Shortridge (1935, 1 p.413) estimated that 40 to 80 survived between the lower Ugab river and the Cunene river. Dr R. C. Bigalke (personal communication) believes that the higher figure is more accurate, but the Black rhinoceros must be considered rare in the territory (Attwell 1948, p.34). It does not appear to range along the Okavango river, but it has been recorded from the Eastern Caprivi.

Southern Rhodesia

The game in Southern Rhodesia is disappearing rapidly owing to the policy of eradicating the tsetse-fly by the complete destruction of the large game mammals. By the end of 1958, of the 667,009 large mammals recorded as destroyed in tsetse control operations, 374 were rhinoceroses. Outside tsetse control areas and those regions where human settlement and farming have exterminated the large game, rhinoceroses are still found (for example in the Sebungwe, Urungwe and North Lomagundi Native districts). D. Swart in May, 1957, saw two groups containing 4 and 3 rhinoceroses on Chiwore river near its junction with the Zambesi. In the Zambesi valley between the Rekomitje and Angwa rivers, they are common, and are molested only by the poacher, and there may be some hundreds (A. Fraser, personal communication).

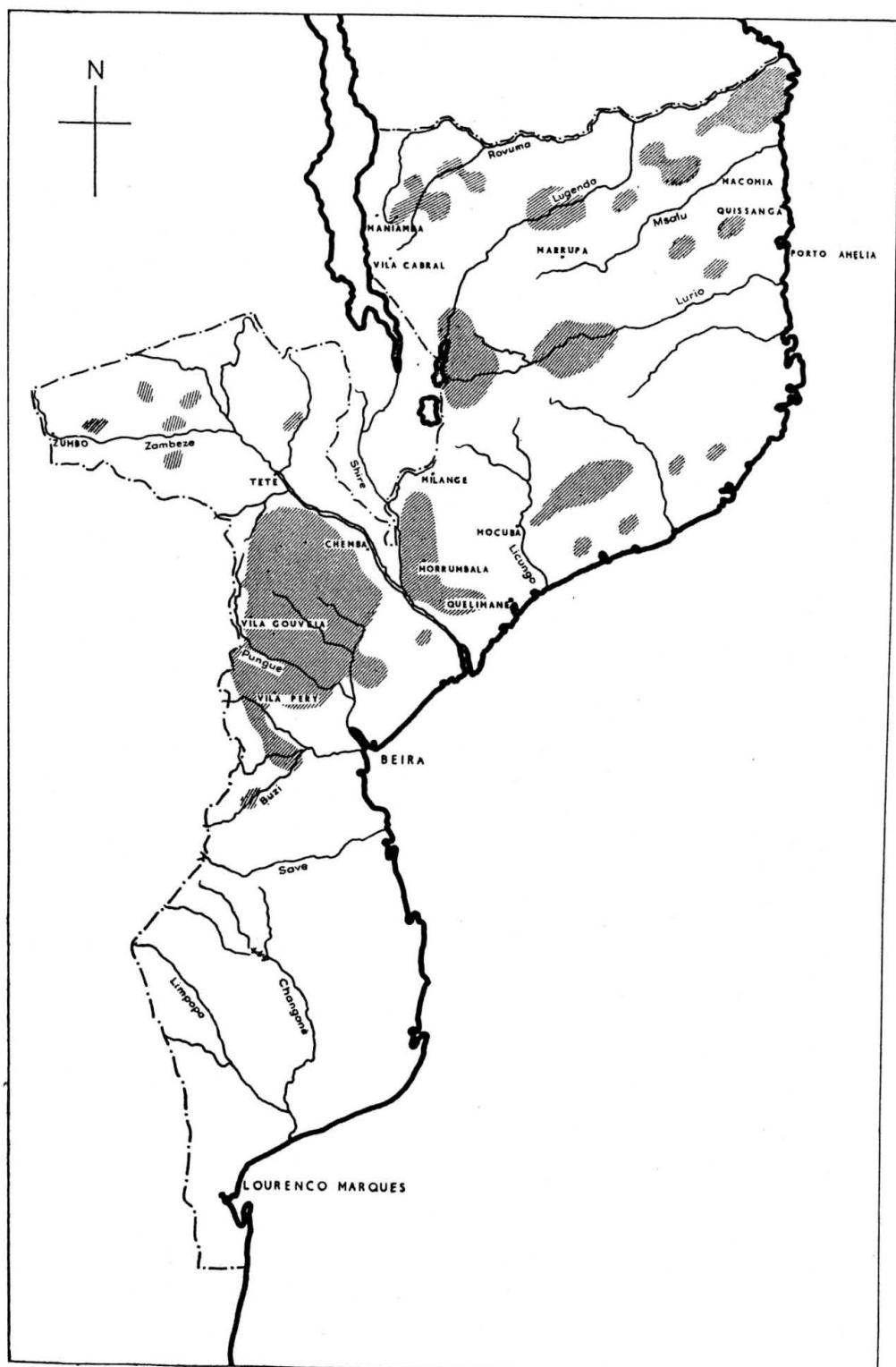
The Sebungwe Native District contains a number of Black rhinoceroses, the majority of which are found between Kariangwe and the Zambesi valley, including the Sijarira range. A small pocket of rhinoceroses established themselves recently in the Chippinga Native District and reports have been received from the south-eastern part of the Nuanetsi Native District, but these were probably founded on wanderers from Portuguese East Africa. A few remained in the Mtoko Native District, along the Mudsi river (1954) but probably they have disappeared owing to tsetse control operations. Today rhinoceroses are few and far between and there is a need for reserves to be set aside in which the Black rhinoceros can be protected from human expansion and tsetse control operations in Southern Rhodesia. Recently a new reserve was made in the Sijarira range which will protect a number of the species. Unfortunately, rhinoceroses do not occur in the Wankie National Park, only one having been reported in the Park since its establishment.

At the end of last century, although the rhinoceroses had already been reduced in number, they were still plentiful throughout a large tract of country along the southern bank of the central Zambesi (Selous 1893, p.58). In 1890, Nicolls & Eglington (1892, p.62) wrote that Black rhinoceroses were very common throughout Mashonaland and that a fair number still remained in the unfrequented parts of Matabeleland, particularly in the portion which "Lobengula called his preserve". During the next ten years these animals were over-hunted, and at the end of the century Kirby wrote (see Bryden 1899, p.38) that only a few were to be found in Matabeleland, Mashonaland and Amatongaland. In 1908, Selous recorded that a few Black rhinoceroses were still found throughout the great stretch of uninhabited country which lies between the high plateau of Southern Rhodesia and the Zambesi river. Jack (1911, p.97) found rhinoceroses in the Gorai Reserve and wrote that in November, 1910, game was plentiful in the Umniati belt on both sides of the river especially in the west (Jack 1919-1920, p.73). Apart from those in the new Sijarira Range Reserve, Black rhinoceroses in Southern Rhodesia are all outside protected areas and, with the expansion of human activities, their range and numbers are declining, and will continue to do so.

Mozambique

At the end of last century, Kirby (1899, p.337) wrote that the Black rhinoceros ranged throughout Mozambique and was fairly numerous in the Chiringoma range. He described it as plentiful to the north of the Zambesi and south-east of Tete (in Bryden et al. 1899, p.38). He was, however, unable to find the White rhinoceros in this region although the country was suitable to its habits.

Today, M. A. de Andrade Silva, Director of the Trypanosomiasis Commission (personal communication) believes that the White rhinoceros has been extinct in the country for a long time, although the Black rhinoceros is still found in many parts of the country. In the districts between the Save and the Zambesi rivers, the rhinoceros is abundant, and between the Zambesi and the Rovuma rivers it is found in fair numbers along some of the water courses and in areas of



Map 16. Distribution of Black rhinoceros, *Diceros bicornis*, in Mozambique.

medium altitude. The rhinoceros is abundant today in the following districts : Barue, Gorongosa (in the National Park, where they are found in the north on the slopes of Gorongosa mountain—Fajardo 1953, p.332; Gomes e Sousa 1955, p.35), Chemba, Morrumbala and Palma: it is found in fair numbers in the districts of Mopeia, Alto Molucue, Gurue, Ribaué, Amaramba and Marrupa, and it is rare in Mossurize, Buzi, Chimoio, Cheringoma, Concelho de Tete, Macanga, Maravia, Zumbo, Namacurra, Mocuba, Milange, Maganja da Costa, Mogovolas, Mogincual, Erati, Vila Cabral, Maniamba, Montepuez, Macondes, Mocimboa da Praia, Macomia and Quissanga ; it is not found in the district of Lourenco Marques, Sul do Save, Sofala, Concelho de Manica, Mutarara, Angonia, Concelho de Chinde, Prebane, Lugela, Ile, Nhamarra, Moma, Concelho de Nampula, Malema, Concelho de Antonio Enes, Meconta, Mossuril, Nacala, Nemba, Mecufi, Concelho de Porto Amelia (see also Roberts 1951, p.241).

It is impossible to estimate the number of rhinoceroses surviving in Mozambique, but it would be only about 500, and these are being rapidly reduced by European hunting and native poaching—the latter being encouraged by the high price paid by Asians for the horns. The majority of rhinoceroses occur in the region between the Save and Zambesi rivers.

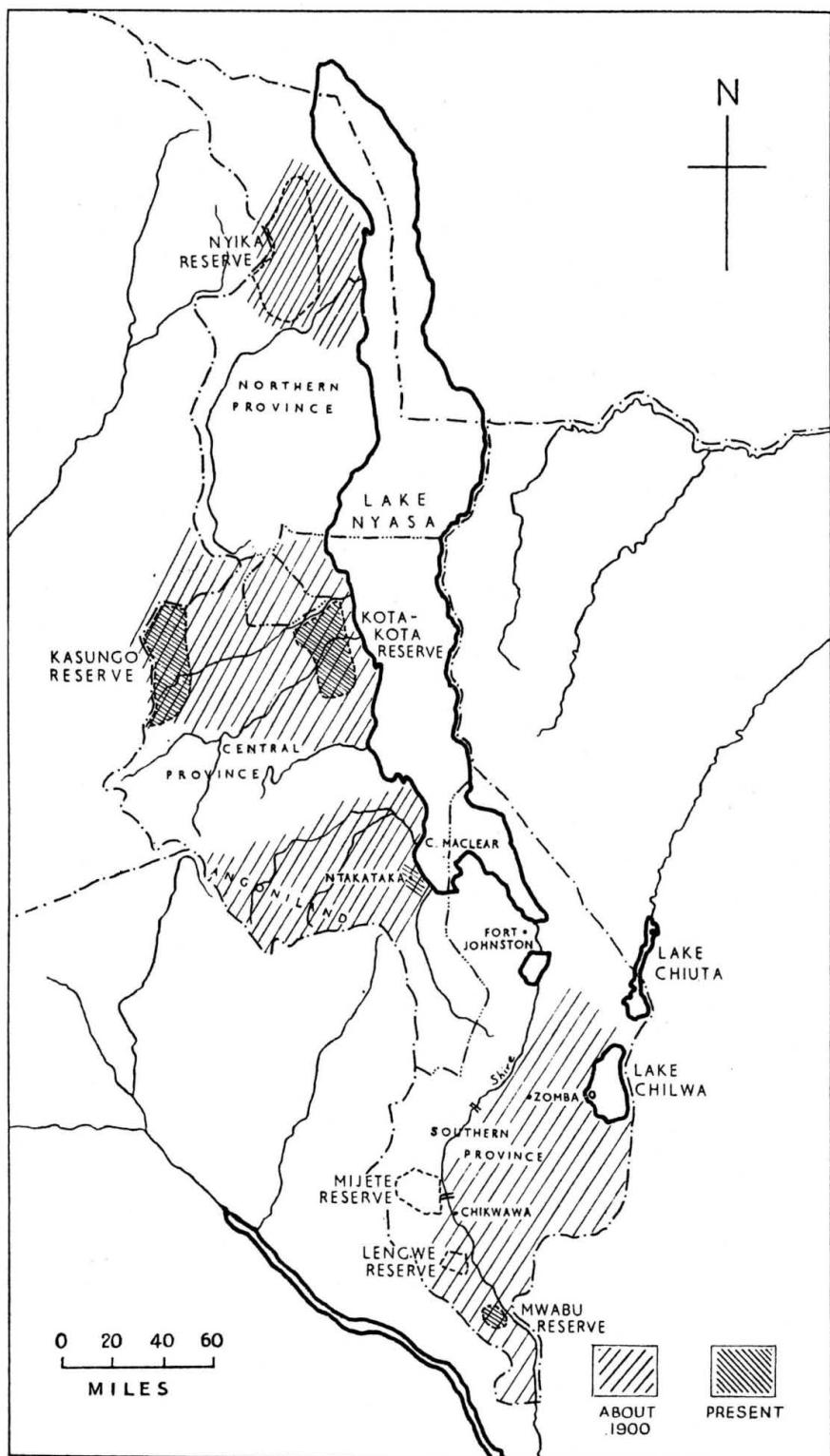
Bechuanaland

The White rhinoceros is extinct in Bechuanaland, and the Black rhinoceros is facing extinction. Its numbers may already be below the survival level of the species, and the Game Warden, Mr P. Bromfield (personal communication) suggests that, from air and ground patrols, it would appear that there are less than 20 remaining. It is possible that they may be moved into the new Game Reserve. According to A. Germond (personal communication 1955) the rhinoceros could still be found in the extreme north-eastern corner of the Batawana Reserve. At one time it was fairly numerous in Ngamiland, Northern Crown Lands and along the Shashi river, but probably was never found throughout the territory owing to the absence of suitable rhinoceros habitat. S. V. Lawrenson (personal communication) saw spoor of two in the Chobe area seventeen years ago, but it was possible that they had strayed in from Northern Rhodesia.

Nyasaland

The Black rhinoceros is still found in Nyasaland today. There are, very approximately, about 70 animals in the Southern and Central Provinces—these are largely confined to the game reserves. Mr G. D. Hayes (personal communication, 1953) writes that Black rhinoceroses are found only in the Southern Province in the Mwabvi Game Reserve, where they were recently discovered. These animals are living in dense forest and thickets into which they have probably been driven from Portuguese East Africa. It is uncertain how many there are, but Mr Hayes gives an approximate estimation of 20 (see also Mitchell 1953, p.99). At the beginning of this century, rhinoceroses were found in the Southern Province in the lower Shire and Ruo districts, but were more plentiful in the Zomba and low-lying parts of the Mlanje districts. Mr Hayes does not mention any in the Zomba area today (Johnston 1897, and Nyasaland, Handbook of, 1910, p.83).

In the Central Province, the Kasungu Game Reserve and the Kota-Kota Game Reserve each contain about 20 rhinoceroses (1953). The Mau Forest Reserve near Ntakataka has two or three, and a pair are known to be living also at Ngara Hill. About fifty years ago, Lyell (1912, p.34) wrote that a few were then to be found in central and northern Angoniland (also Wood 1928, p.112). Murray in 1932 (p.329) wrote that although they were not common, they were still found in Kota-Kota and Ngara districts and near the Nyika Plateau. The Nyika Plateau is in the Northern Province, and Mr Hayes suspects that rhinoceroses are living there today, but he has no evidence of their presence (see Mitchell 1953). Mr Crawshay found rhinoceroses in the central part of the northern Nyasa district (see Johnston 1897), and they are also mentioned occurring on the Nyika Plateau in the "Handbook of Nyasaland for 1910". It is possible that a few rhinoceroses still remain on the Nyika Plateau today although it is doubtful since the plateau does not appear to be normal "rhino habitat". According to Captain C. Pitman (personal communication) the adverse climatic conditions and wrong vegetational types make it extremely unlikely that, even in the past, rhinoceroses would occur on the plateau, other than as migrants.



Map 17. The present distribution of Black rhinoceros, *Diceros bicornis*, in Nyasaland compared with that of about 1900.

Northern Rhodesia

The Black rhinoceros is still fairly numerous in Northern Rhodesia (Lancaster 1953, p.46). The largest concentrations are found in Northern and Eastern Provinces on both sides of the Luangwa river. The remainder are found in very small numbers in isolated patches in Central and Southern Provinces. They are extinct in Barotseland.

The Eastern Province contains, very approximately, about 150 Black rhinoceroses. Their tracks are seen at fairly frequent intervals in the Lukusuzi Reserve and less frequently along the Luangwa river, where they are sparingly but widely distributed in the valley and escarpment areas. Mr B. Shenton (personal communication 1953) estimated that the population in this area is approximately between 120 and 150 animals. They are unheard of as permanent residents on the Lundazi Plateau area. The eastern escarpment contains a few resident rhinoceroses. Four are known to live permanently in the Petauke district, but as they are apt to cross the Luangwa river during the dry season, the population varies a little from time to time. In the Fort Jameson district, about six live in, or near, the Nsefu Reserve (Anon. 1952a, p.185), and an odd one has been seen along the Luangwa to the south as far as Malama. From a visit to Nsefu Camp in October, 1958, during which the writer saw 3 rhinoceroses and a fair amount of spoor during a short walk, there would appear to be a larger number in the area. The rhinoceros population for this district is probably between 10 and 20.

Mr E. Poles (personal communication, 1953) writes that in the Luangwa Valley Game Reserves and in the Munyamadzi Controlled Area, the rhinoceroses are widely distributed in small numbers in the vicinity of perennial rivers and streams. Their total population is approximately 350. According to Hughes (n.d. p.229) rhinoceroses have been plentiful around the source of the Lumbatwa. They came up from the Luangwa valley by climbing the Mchinka Escarpment. In the Bangweulu basin they were confined to the stretches of country between the Lulimala river on the west, and the Chambezi river on the east. In the lower Luangwa valley, in Central Province, Major I. Grimwood (personal communication, 1953) reported approximately six survivors on the right bank of the river in the Chisomo Controlled Area and that part of the southern section of the Luangwa Game Reserve lying in the Serenje District, and a further four on the Rufusa river a few miles up from its confluence with the Luangwa.

The Luano valley, which joins the Luangwa from the west and is drained by the Lunsemfwa river, is reported by the same source to hold remnant populations on both its northern and southern escarpments. The northern group is confined to the escarpment east of the Mkushi river and is estimated at about six : those on the southern escarpment are found on the Chiwala and Masaka streams and total approximately ten.

In the Zambezi valley, the rhinoceros is almost extinct on the Northern Rhodesian bank, although it is still plentiful in some areas on the Southern Rhodesian side. Grimwood (1953) reported about ten surviving in the Mpato Gorge area and a little upstream, but believed that the two shot near the mouth of the Chakwenga tributary in 1946-47 were the last in that area. Although they were once quite common in the Zambezi valley between Chirundu bridge and the Victoria Falls, Mr Vaughan (personal communication, 1953) considers that not more than six survive. Mr Ansell believes that they probably still exist on the upper Nalusanga stream in Chief Munyumbwe's area, and Major Taylor reports seeing a solitary specimen due south of Batoka in the Gwembe District.

The Black rhinoceros is believed to be extinct in Barotseland.

A few remnant groups of rhinoceroses are still to be found on the plateau areas of Central, North-Western and Southern Provinces, some of which occur in the Kafue National Park which overlies part of all three provinces.

In the North-Western Province (Kasempa District) sector of the Park, Mr Ansell (personal communication, 1953, also 1957, p.24) reported that rhinoceroses were still to be found in small numbers, although his observations from 1948-1951 made it clear that the position of the species was more satisfactory than had hitherto been supposed, even if still by no means good. The only animals seen were a bull and its mate near Moshi, but fresh spoor was found in several places, and the rhinoceros is known to inhabit both banks of the Lower Lufupa (i.e. below the Temwa junction), the lower Temwa, the lower Moshi, the Chibemba and upper Mikenga and the Musekwa. More

