A SURVIVAL BOOK ON RHINOCEROSES

Black Rhinos in Amboseli

S.O.S. Rhino

C. A. W. GUGGISBERG

A SURVIVAL BOOK

Editor Colin Willock

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Foreword

I have had a close personal interest in rhinos ever since a three and a half tonner, up to that moment the largest land animal ever captured alive, rammed its horn through the side of a catching truck, not eighteen inches from my left leg. That was in Madi District of Uganda, in 1961. The Uganda Parks and Game Department had decided to try to save the country's few remaining white rhino and move them two hundred miles to the security of Murchison Falls National Park.

Our expedition was lassoing the rhinos because, at that time, the pharmacologists hadn't perfected a drug that would immobilize them without danger to the animal. Now rhino darting, loading and transporting has, thanks to the right drugs, become almost a routine operation. In Natal, the South Africans have been capturing their surplus white rhinos for some time past and transplanting them to areas from which they have long been exterminated and, as an added precaution, to zoos all over the world.

Alas, there are very few places left in the world where there is a surplus of rhinos, as Mr Guggisberg so forcefully points out in this book. Javan, Sumatran, Indian, African – black or white – they are all on the poacher's wanted list for the sake of their horn and its allegedly, but actually non-existent, aphrodisiac qualities.

Despite its apparent formidability, the rhino is, unfortunately, an easy animal to kill. Even inside parks and reserves, the world's surviving rhinos are by no means safe. No poacher wants their meat. All he is after is the ten or twenty pounds of horn on the end of their noses and this can be hacked off within minutes.

I'm afraid that I share with Mr Guggisberg a distinctly gloomy view of the future of these splendidly prehistoric creatures—at least in the wild. It seems strange and terrible than an animal that has existed for so much of the world's history should suddenly, within the last hundred years, be persecuted to a point at which several, if not all, species are in danger of disappearing.

The author, who is a most distinguished naturalist living in Kenya, obviously has a great affection for rhinos. They may not appear all that lovable, but, believe me, you can quickly get to like them. Once I had recovered from my initial fright at being charged by the rhinos, I found that black and white, they were peaceable, if unpredictable, creatures who really didn't want any trouble. In captivity, they settled down quickly and became very distinctly individual personalities. Even a year or more later when I saw some of them at large in Murchison Falls Park, I was able to recognize them instantly.

My own experience of rhinos is, of course, only a tiny fraction of Mr Guggisberg's. But then, he lives in rhino country. The result of my first encounter with the white rhinos of Madi District was a film in Anglia Television's 'Survival' series which we called 's.o.s. RHINO'. 'Survival' has since then made several films about the rhino's plight, including programmes about successful rescue and transportation attempts in Natal and again in Uganda, the second time by drug and helicopter.

Just the same, when we came to find a title for this SURVIVAL BOOK, we felt that we couldn't do better than go back to the name of that first film. 's.o.s. RHINO' sums up the situation of rhinos the world over, from Sumatra to the Sudan.

COLIN WILLOCK.

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The photograph of the Javan rhinoceros is by Mr A. Hoogerwerf, all the other photographs were taken by the author.

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1 Rhino Sanctuary

The setting sun was close to Longido Mountain, and the ice-covered top of Kibo – main peak of Kilimanjaro – began to emerge from the cloak of dark clouds which had veiled it all day long. Unbelievably high, its glistening splendour cold and remote, it looked a world of its own, far apart from the teeming life of the African plains. Innumerable game animals surrounded us, as we drove through the Amboseli Reserve. Rosanne, my wife, and I had found the elephants we were after to be rather unco-operative, sticking doggedly to swampy ground, where we could not get as near as we would have liked, and now we were wending our way back to Ol Tukai, the permanent camp which had been established a few years earlier.

I had just packed my camera equipment, when we discovered a rhino with a small calf, standing on the edge of a patch of dense bush. We stopped the car in order to have a better look at the animals. Focusing my field glasses on the cow, I almost gasped with amazement, for she had by far the longest front horn I had ever seen on a black rhinoceros. It was certainly not under forty inches, probably quite a bit longer, inclined forward at an acute angle, and showing a slight, but graceful curve towards the tip. The posterior horn stood up straight as a spike and was also of exceptional length. Another surprise was in store for me, when I switched my attention to the calf, which was standing close to its dam's side, for the little fellow, not more than four or five months old and shaped exactly like a sausage on four legs, had no ears and only half a tail.

With the sun just about to set, it was too late for photography. Worse luck, this was our last day in the game reserve, and there would be no chance to look for the animals on the morrow.

In September of that same year, Rosanne and I had an unexpected opportunity to visit Amboseli again. Our first thought was to find the wonderful rhino cow once more. We caught up with her on the second day of our search. She stood in thick bush surrounding a group of trees, and at her side we could just make out the back and head of the earless calf. In March, when we got our first glimpse of the two animals, I had assumed the youngster to have been mutilated by hyenas or hunting dogs. The Warden of Amboseli Reserve was, however, very positive that the calf had actually been born minus ear trumpets and half its tail. I now carefully examined the ear holes through my binoculars and came to the conclusion that the Warden was perfectly right, for I could not detect even the smallest sign of scarification.

The rhinos were much too hidden for any really worthwhile pictures, and after a few minutes they withdrew even deeper into the bushes. I gradually began to give up hope, but all at once there was a thudding of heavy feet, and a cow rhino with an even longer horn, followed by a fairly big calf came crashing through the thicket, charged the mother of the earless one and put her to flight. We hurriedly skirted round the patch of bush and managed to catch the fugitives as they came out on the opposite side.

This was the opportunity I had been dreaming of ever since having had my first look at that fabulous horn, and I made full use of it, exposing half a dozen pictures in quick succession, as the two animals trotted past our car. A keen photographer is, of course, never satisfied with what he has got, and we followed the rhinos for a little while, hoping for another chance. They showed no sign of stopping, however, and we finally doubled back to the thicket from which they had emerged, circling it in search of the enormous cow which had turned up so unexpectedly and, as far as my photographic activities were concerned, fortuitously. Time and again we drove around those bushes and were just coming to the conclusion that she must have moved on, when Rosanne, standing with me on the back of the lorry, spotted a patch of

grey among the green leaves. One look through my glasses satisfied me that it was in fact the back of a rhino, and I asked the driver to push the car as far into the thicket as he possibly could. When we finally came to a halt, I climbed on top of a petrol drum and from that elevated, but by no means safe position, I was able to see both the cow and her calf.

What a horn she had! It protruded straight forward from her nose, like the bowsprit of a sailing ship, tapering to a very thin point which curved upward quite sharply near the end. I could see one of her ears hanging down, presumably a souvenir of some rhinocerontine battle. The calf did not approve of our presence at all. It was fidgety and kept moving nervously around its mother. From one moment to the next I expected the cow to be infected by its anxiety, and if a sudden charge should force the driver to start the car with a jerk, I had a very good chance of toppling off my lofty perch and falling straight onto that menacing horn. But there was no charge. The rhinos suddenly turned and galloped away, their twisted-up tails making them look like a couple of very fat pigs.

The African game scout we had taken along from Ol Tukai knew both these long-horned cows very well. The one that had just run away he called 'Number One', as she sported the longest horn of all Amboseli rhinos. The mother of the earless calf was, of course, 'Number Two'. The animals were destined to attain world fame under the names of 'Gladys' and 'Gertie', while the earless calf became known as 'Pixie' to the Europeans and as 'Masikia' (ears) to the Africans.

A year passed before we found ourselves in Amboseli again. At this point I better explain that Ol Tukai Camp – or Lodge, as it is now called – has been built close to a large swamp marked on the map as Loginya. Driving three and a half miles in a westerly direction, you come to another swamp, which the Masai call Engoni Naibor. On its western edge there rises a pudding-shaped lava kopje, from the top of which you can usually spot elephants, buffaloes, and rhinos. It is therefore known by the very appropriate name of Observation Hill. If you are standing on this eminence, Engoni Naibor lies east of you, while to the south looms the dark mass of Kilimanjaro, its crowning

glory so often hidden by clouds for most of the day. Turning towards the west, you look over three or four miles of bush, acacia tops, and open flats, to the Kiturua Hills, a group of lava blisters similar to Observation Hill, though somewhat higher, and to Longido and Namanga Mountains, which overlook the Nairobi-Arusha road a good forty miles away. To the north there is a wide sweep of open country, extending past one end of Lake Amboseli to ranges of low, blue hills in the far distance.

At the time I write about – the year 1955 – the swamp of Engoni Naibor was quite small and without an outlet. Since then it has risen considerably, and in the course of 1958 it began to overflow into a dry river bed. This newly formed stream, the Simek, is still running fast and has created a long chain of swamps and ponds right down to the lake. Where once there was just a stretch of dusty semi-desert, you now hear the joyous cry of the fish eagle, the honking of Egyptian geese, and the sonorous grunting of the hippopotamus.

It was not far from Observation Hill that we had seen Gladys and Gertie with their respective calves in September 1954, and in that same area we came across Gladys on our first drive through the reserve in October 1955. She was accompanied not only by the calf we already knew – now quite a big animal – but by three other rhinos which, according to the Game Scout, were former children of hers. The five animals stuck close together and presented a spectacle that was as impressive as it was surprising, for, like almost everybody else, I had come to consider the black rhinoceros as a creature of rather solitary habits, wandering around singly, or in groups of twos and threes. Nor was it an accidental gathering, for they kept up their association during the whole of the five days we were able to spend in the reserve. Gladys, incidentally, had lost the sharp-pointed tip of her horn, which was now as straight as a spear and somewhat shorter than Gertie's.

We also renewed our acquaintance with Gertie and Pixie, and watched the two placidly browsing on bushes and fallen trees. Pixie had grown a lot in course of the last twelve months and was now more than three-quarters of his mother's size. But he still hung on to her apron strings and when, on one occasion, he lost contact with her, he uttered

a series of plaintive noises, somewhat like: 'Mfee . . . mfee . . . mfee . . .', most ludicrous sounds to come out of such a bulky body. We were interested to see how used Gertie had become to cars. She paid not the slightest attention to us, and I was able to get excellent close-ups of her. Gladys, too, had undergone a considerable change in her attitude towards human intruders – or rather towards their vehicles – even though she seemed slightly less confiding than Gertie. Having her standing close to the car, filling the viewfinder of my camera, I had to think of how she and her calf had run only a year earlier!

In 1956 both cows produced calves – Gertie probably about May 4th, Gladys around mid-June – and as we had by now become deeply interested in the Amboseli rhinos, we again decided to spend part of my local leave in the reserve. Arriving at Ol Tukai at noon on September 18th, we pitched our tent near the permanent camp and immediately drove over to Observation Hill. We found Gertie after a very short search, but she was standing in very thick bush, and her new offspring was completely hidden from sight.

Next day she was still in the same patch of bush on the edge of Engoni Naibor, and as she did not show any signs of moving, we decided to try and get as close to her as possible. Standing in the back of the Land-Rover, I directed Rosanne, who was at the wheel, and after a lot of careful manoeuvring we got into a position from where I had an excellent view of the cow and could just see the big ears of the calf, which had clearly not been born with the same deformity as Pixie. Gertie was much more nervous than she had been the year before. Having a small calf at heel had obviously taken away some of her trust in the strange, noisy and smelly creatures which moved through her habitat in rapidly increasing numbers. She stood over her child, rocking from side to side, her front horn pointing straight at me, while I busied myself with my cameras. Suddenly she took a few steps forward, and Rosanne, who had hitherto not been able to look over the bushes from the driver's seat, became aware all at once of how near we really were to our quarry. I saw her hand hovering near the starter, but Gertie stopped, and there seemed to be no immediate danger. The calf followed its mother, and I got one glimpse of the little creature.

It had a disproportionately big head, and the front horn was just a tiny bump on the nose. Next moment both animals had been swallowed up by the surrounding greenery. I had felt quite safe as long as I could see Gertie and knew what she was doing, but to have her invisible and somewhere nearby in her present nervous state was rather disturbing. Rosanne backed the car very smartly and with an audible sigh of relief, relaxing only when we were in open country again.

In the afternoon we managed to find Gladys as well. Her three months old calf stood close to her hind legs, almost underneath her belly and was busy suckling. Unfortunately it had selected the teat on the side away from us, and I realized that it would not show up very well on the pictures I was taking. The cow was anxiously sniffing the wind, holding her head high and moving from side to side. She, too, proved to be much more suspicious of cars than she had been, and not wanting to upset her unduly, we withdrew as discreetly as we could.

In the middle of the following night I was woken up by steam engine puffs a few yards away. A full moon was shining, and sticking my head through the tent flaps, I saw two rhinos walk past, looking ghostly white in the strong, silvery light. With the phosphorescent glow of Kilimanjaro's ice cap high above them, they made a picture I shall never forget as long as I live.

What about Pixie, now just about three years old? The Game Scout reported that he was seen from time to time, but search as we would, we could not find him. He was nowhere in the vicinity of his mother, who had probably chased him away shortly before she gave birth to the new calf. Having seen Pixie's distress when he accidentally got separated from Gertie for just a few moments, we could well imagine what a state the poor chap must have been in and felt genuinely sorry for him. To us, the Amboseli rhinos had long ago ceased to be 'stupid brutes', as their kind are now so often referred to in books. They had become striking and lovable animal personalities, who had their problems, their trials and tribulations and were more deserving of sympathy than many a blown-up member of the species *Homo sapiens*!

We had not been wrong in assuming that Pixie would find it hard to be on his own, for in January 1958, when he was almost four-and-a-

half years old, we saw him pathetically following Gladys and her calf about the place. The big cow went for him again and again, but he kept coming back. Why did he try to join Gladys instead of his mother? Perhaps Gertie had driven him off so often and so insistently that he was now looking for company wherever he could find it. He certainly showed signs of rough handling – or should I say 'horning' – and we dearly wished that his mother might relent and accept him back into the family, as Gladys had let three of her former children join her a couple of years earlier.

We did not meet Pixie again until February 1959, when we found him at last as a member of a group – I am almost tempted to call it a 'herd' – of five rhino, all youngish animals and very probably offspring of Gladys and Gertie. When we first saw them they were asleep right out in the open, and as we watched one rose and started pushing the others until two of them got to their feet as well. All three went browsing on some nearby bushes, but they soon got tired of it, settled down again and continued their interrupted snooze. Later in the same year a friend of mine came back from Amboseli with pictures of a group of rhinos and I was able to identify not only Pixie and his pals, but also the exact spot where the animals had been eight months before.

It thus did not come as a surprise to me, when, on sweeping the country with my telescope from the top of Observation Hill one evening in February 1960, I discovered no less than six rhinos congregated in that very same spot, a couple of hundred yards to the right of the Simek River. Rosanne and I hurriedly got aboard the Land-Rover. The sun was low in the sky, but we managed to get to the rhinos in time. As we had expected, we found not only our friend Pixie, but several other animals that looked very familiar to us.

Next morning five of the rhino were still in the area, though in two groups, one of two and one of three, which had drifted about 200 yards apart. Keeping them under observation for the rest of our stay in the reserve, we found that they regularly separated during daytime, going about their business without paying much attention to each other. We met Pixie quite alone on the left bank of the river and came across another member of the group, recognisable by a big, fly-covered

wound on its flank, even farther away. In the late afternoon they all gathered again in the place they had favoured for so long. Once two of them had a slight argument, standing nose to nose, snorting, blowing up dust, lunging at each other with lowered horns, but nothing serious came out of this sparring match.

I notice that I have got rather far ahead with my Amboseli chronicle, having left Gladys and Gertie back in 1957 with their young calves. As these youngsters grew up, the mothers gradually lost their nervousness. But while they again accepted the presence of motor vehicles with the utmost unconcern, this was by no means true of their children, who both had a strong tendency to take cover behind their dams, whenever a car came too close. Young rhinos are said to have considerably better eyesight than adults and I wonder if this might possibly account for their nervous behaviour.

A couple of months after our 1959 visit to Amboseli, Gertie lost her spectacular horn. As the animal had meanwhile become something of a celebrity, the event was considered a 'news-item', and the *East African Standard* of May 1st brought the following article: 'Gertie of Amboseli, the most photographed rhino in the world, has lost her four foot long front horn. It appears that five nights ago Gertie had a fight with Harry the Hippo. Although nobody witnessed the battle, evidence on the ground indicated a major conflict. Gertie next day looked very forlorn, with only her second horn remaining. The entire front horn had been torn off. Game Department officials, after a three day search, found the main part of the missing horn. It measured thirty-eight inches, and the tip, which is still missing, is believed to be another ten inches. No. 1 star of Amboseli is now Gladys, who broke off the tip of her horn some years ago, giving Gertie pride of place. Gladys and Gertie are thought to be closely related, perhaps mother and daughter. An official of the Royal National Parks said it is possible that the horn will grow again. Even if it does not, Gertie can retire from the limelight, knowing that "Pixie" (Masikia), her daughter, will one day be a star. For Pixie has no ears.'

This account erred in one respect, for though most people talked of Pixie as a daughter, he was, in fact, Gertie's son!

Gertie promptly made up for her disfigurement by producing a female calf on about July 16th. She first kept it hidden for a few weeks, as was her usual custom.

By a strange coincidence, Gladys was not destined to remain Amboseli's 'No. 1 star' for very long; in October of the same year, she, too, lost her front horn. Even though the two famous cows were not as photogenic as before, they had so endeared themselves to visitors to the Amboseli Reserve, that they remained Kenya's most popular tourist attraction next to the lions of Nairobi National Park.

It therefore came as a great shock, when in January 1962, at a time when abnormally heavy rains interfered with the regular patrolling of the reserve, poor old Gladys was foully murdered by poachers. She was sincerely mourned by all who knew her, and I am certain that a good many people got some satisfaction out of the fact that the murderers were quickly apprehended and duly punished. One might, of course, have wished for the punishment to be considerably harder than it actually was.

Not long after the untimely death of Gladys, Gertie got into a scrap with another rhino and had one eye badly damaged. As there was danger of an infection, which could easily have proved fatal, the Game Department authorities decided to help the distressed animal. Gertie was put to sleep by means of a capture-gun, a veterinarian removed the eye, disinfected the wound and neatly sewed up the eye cavity. When the patient woke up, she was none the worse for her experience, the lack of one eye being no great hardship to an animal as myopic as a rhino.

In course of our 1962 visit we got acquainted with a bull, having a front horn very much longer and thinner than male rhinos usually carry. The Game Scout declared him to be a son of Gladys and judging by the length and shape of his horn, I am inclined to accept this statement. But if the laws of genetics had seen to it that he inherited his mother's most prominent feature, he certainly was not as good-tempered as she had been most of the time, for the Scout warned us that this 'faru' (rhino) was 'kali' (bad) and had a reputation for attacking cars. I nevertheless obtained some excellent photographs of the bull

and in my notes I referred to him as 'Longhorn'. Pixie, we discovered, had taken up residence on the marshy bank of the Simek River, an area he was going to stick to for the next two years. He is, in fact, still there as I write these lines!

In 1963 I managed to get in only one short visit to Amboseli. The trip was worth while, however, for I saw Gertie and her calf in the company of four other rhinos, all looking as if they were very much used to each other and had been together for some time. My wife and I had to go to Europe for a few months soon afterwards. We were back in Nairobi by the end of January 1964 and on the way to Amboseli on February 6th, burning to find out how our rhino friends had fared in the meantime. Pixie was in his usual haunts along the right bank of the Simek. Longhorn had joined up with two females, a big cow with a nice, well-curved horn, and a smaller one, which might have been her almost full-grown daughter. Gertie we found ambling around not far from Observation Hill, closely followed by her calf of 1959.

We were able to devote considerably more time to rhino watching in September of the same year, and this seemed a good opportunity to study various phases of their behaviour about which I was still fairly ignorant. We naturally thought that in course of these investigations we would see a lot of Gertie, but to our amazement several days elapsed before she finally turned up in one of her favourite spots. The calf, now five years old, was still with her, very nervous, and still taking cover behind mother's massive bulk. For some time past we had noticed that Gertie's broken horn was growing again, and it had now attained a length of eight to nine inches. This adds up to an increase of roughly one and a half inches per year.

Gertie was quite obviously pregnant, her belly hanging almost to the ground and the two teats very well developed. I think that this fact probably accounted for her unusually secretive ways. After having been around for one day, she again vanished from sight, but we occasionally came across her tracks and had a strong suspicion that she was hiding in some extensive patches of bush halfway between Observation Hill and Kiturua.

We saw Pixie every day. He had a proper 'bed' among some bushes,

which showed all the signs of having been used for years. Most of the time he could be found feeding along the Simek River, but on one occasion he ambled out across the grassy plain until he was a mile, or even a mile and a half from his home. He had become just about the tamest rhino in all Amboseli, and we often parked our car a few yards from him, in order to see what food-plants disappeared inside his yellowish-brown mouth. Looking at him from such a short distance, we realised that the *East African Standard* had been right – Pixie had well and truly turned into a star, for on his forehead he was growing a third horn!

We also noticed that he had the ability to move his earholes, more or less to twitch them, as another rhino would twitch its ear trumpets. It may be the place to mention that Pixie is not quite unique in having to go through life without ears and with only half a tail. I have myself seen a rhino exactly like him in Ngorongoro Crater, and others have been reported from the Serengeti Plains and from Tsavo National Park. Kalman Kittenberger, the Hungarian naturalist, mentions shooting an old bull whose ears and tail were missing. He thought these injuries had been inflicted by a lion when the animal was a calf. But as I have already pointed out, there can be no doubt that all these rhinos were actually born earless, their deficiency probably being the result of some strange mutation.

My story so far has mainly been about Gladys and Gertie, about Pixie and other offspring of the two long-horned cows. On all our visits to Amboseli we have naturally seen a lot of other rhinos as well, and in September 1964 we made an actual census of them. In an area ten miles long and three and a third miles wide, we finally counted thirty-five rhinos – twelve bulls, seventeen cows and six animals we were not able to sex, but of which five were calves. There were eight cows followed by youngsters, ranging in age from about one year to almost full grown. On the outskirts of our counting area we saw the tracks of between five and ten more rhino, and it seems fair to assume that there were some hidden in Loginya Swamp which we never caught sight of. The central area of the Amboseli Reserve thus contains about fifty rhinoceroses.

This may seem very satisfactory, especially for a stretch of country much of which cannot be considered as permanent rhino habitat. Some people will probably think that there is no need to worry about the black rhinos' survival as long as you can still find fifty of them in an area of only thirty-five square miles. But we must remember that a similar, and even higher, population density was at one time to be found over vast areas of Kenya and northern Tanganyika, where rhinos are now very scarce or altogether extinct. We are overjoyed if we see a dozen to fifteen rhinos in Amboseli in one day. The early explorers, marching across the East African plains with their caravans of porters often saw twenty to thirty day after day! The Amboseli Reserve is in reality a rhino oasis, and everything possible has to be done to keep it intact and to protect it against any kind of encroachment. Long may things remain like this. But one must constantly bear in mind that the high density inside a reserve like Amboseli is a glorious exception in Africa today. In the vast unprotected areas there is very little large wildlife. And this is more true of rhinos than of any other species. As far as rhinos are concerned this, alas, is the case not only in Africa but wherever they occur throughout the world.

2 Family History

Man has a passion for ancient things. He pays fabulous sums for antiques, fills museums with relics of past civilisations, restores castles, preserves mansions and gazes at the pyramids with reverence. But what are the pyramids, or even the wonderful stone age paintings in the caves of Spain and southern France, compared with the forms of life that have come down to us from ages immeasurably more remote, and which we destroy so callously, either for pleasure or for personal gain! A building or a work of art that gets damaged or destroyed accidentally or in course of some outburst of political stupidity, can quite often be reconstructed. The senseless extermination of species that has evolved over the course of millions of years is final, and all our scientific knowledge will not help us to recreate what we have lost.

We burst with pride if we are able to trace back our ancestry for five or six hundred years. The family tree of the rhinoceroses can be followed into the dim past of almost sixty million years ago. At one time there were many branches and a great number of species, amongst which was possibly the largest land mammal ever to tread the earth. There are a mere five species surviving today, and of those five living monuments, so ancient that by comparison the pyramids date from yesterday, we humans have just about managed to wipe out two, have reduced two more to pitiful remnants, and are now busy slaughtering the fifth!

Rhinoceroses once occurred in Europe, and medieval workmen must have wondered when they occasionally came across their remains in

quarries and excavations. For a long time such bones were thought to provide irrefutable evidence of the existence of giants and dragons. In fact, a sixteenth-century sculptor, who had to do a dragon for a monument in the Austrian town of Klagenfurt, used the skull of an ice age rhinoceros as a model for his monster's head. Some rhinoceros bones found at Chartham, Kent, were described as those of a 'Sea monster' by one William Somner in a small tract published in 1669 and entitled 'Chartham News; or A Brief Relation of some strange Bones there lately digged up in some grounds of Mr. John Somner of Canterbury.'

In 1771, the frozen carcass of a hairy rhinoceros came to light on the banks of a tributary of the River Lena in Siberia. The German naturalist Blumenbach, who had already introduced the mammoth to the scientific world, published a description of this animal in 1799 and named it *Rhinoceros antiquitatis*.

Many more fossil species from Europe, Asia and North America became known in course of the nineteenth century. When Trouessart compiled his monumental catalogue of living and extinct mammals, he found himself with no less than 170 rhinoceroses on his hands, all duly named, described and alloted to forty-two different genera. The list looked formidable enough, but there was a lot of uncertainty and confusion with regard to the relationships of the different species to each other and to the living rhinoceroses of Africa and southern Asia.

In 1898 an American palaeontologist, Henry Fairfield Osborn, set out to remedy this confusion and, if possible, to reduce the rather excessive number of genera and species. He began by studying the material that had been gathered by expeditions sent out by the American Museum of Natural History, and then went to Europe to examine the fossils over which Blumenbach, Cuvier and many other great scientists had pondered. As he progressed, sketching, making copious notes and composing memoranda, he often had to blow clouds of dust from the priceless specimens; and in some places, ancient museum officials, almost as dusty as the treasures they guarded so jealously, were not at all keen to open the rusty locks and to let the young American get at the trays of bones. But as the value of his work

became evident, Osborn received support from influential people and things became easier.

Osborn succeeded in working out the main lines of rhinoceros evolution and thus laid the foundations of our knowledge of the family tree of these intriguing animals. His studies led him to the conclusion that the present-day species, although very similar in external appearance, were nevertheless far removed in their history and anatomy.

Plenty of additional material has, of course, been unearthed during the last sixty years or so, especially with regard to the earliest forbears of the rhinoceroses and of the group to which they belong, the *perissodactyls* or odd-toed ungulates. Even though admitting that a strange quadruped called *Hyrachyus*, the bones of which had been dug up near Fort Bridger in Wyoming, might be closely related to the earliest ancestors of the rhinoceroses, Osborn had thought that the question of their true origins had still to be solved, and he expected the crucial finds to be made somewhere in Asia. Nowadays there is a strong tendency to consider the *Hyrachyds* as the actual ancestors of all the rhinoceroses, excepting only their close cousins and contemporaries, the *Hyracodonts*, whose line became extinct.

Representatives of the genus *Hyrachyus* made their appearance very early in the Tertiary Age, during a period the geologists call the Eocene. If you came across a live *Hyrachyd*, you would not dream of connecting it in any way with the rhinoceroses, for you would see a small, agile and slimly built animal with a flat, hornless head. It might almost be taken for a miniature horse, and *Hyrachyus* was in fact closely related to *Hyracotherium*, the oldest known ancestor of the horse, the *Eohippus* or Dawn Horse of many authors.

Some of the early rhinoceroses – the *Caenopenes* and the *Aceratheres* – may have looked like lightly-built tapirs, slim-legged, swift-running animals, with not a trace of a horn on their noses. The most primitive *Aceratheres*, which still had four toes on their forefeet, have been found in America. At a later date the members of this genus, now having three toes on all four feet, swarmed far and wide over the northern hemisphere. A few reached the size of the Indian rhinoceros, and just before they faded away in the middle Pliocene, they began to develop

small horns. They probably never had a chance to make much use of these nasal appendages, their main weapons of defence being the second incisors or cutting teeth of the lower jaws, which became enlarged into quite serviceable tusks.

To some fairly close relation of the *Aceratheres*, the *Paraceratheres*, belongs the distinction of having produced the most gigantic of all rhinoceroses, the *Baluchitheres*. The name points to Baluchistan, and it was in fact there that an English palaeontologist, C. Forster Cooper, first came across the remains of one of these monsters. He only found some fragments of leg and foot bones, and three neck bones, but the circumference of those vertebrae must have fairly taken his breath away. He had no hesitation in stating that *Baluchitherium* had been an animal of unprecedented size, 'closer of kin to the rhinoceros than to either the horses or the tapirs'.

Additional bones found in Turkestan by Borissiak, a Russian scientist, fully confirmed Cooper's conclusions, but *Baluchitherium* really 'hit the headlines', in the early twenties, when the famous Central Asiatic Expedition under the leadership of Roy Chapman Andrews, sent to the Gobi Desert by the American Museum of Natural History – of which, incidentally, Osborn was now the director – brought back not only various leg bones, part of a shoulder bone and a jaw, but also a complete skull, fully five feet long, which had been excavated by Walter Granger, the expedition's palaeontologist. With a length of twenty-eight feet and standing seventeen to eighteen feet at the shoulder, *Baluchitherium* equalled or exceeded the imperial mammoth, largest of all fossil elephants. It walked the Mongolian plains on high, pillar-like legs and must have had a truly massive neck in order to carry the enormous head. The short grinding teeth point to its having been a browser, feeding on the leaves and branches of trees after the manner of the giraffe. There were no horns, but the giant was not defenceless, the second incisors of the upper jaws having grown into a pair of very formidable tusks. As far as we know, the *Baluchitheres* disappeared during the upper Miocene. They had, perhaps, reached a stage of over-development which made them vulnerable to even slight changes in their environment.

At this point of the evolutionary history of the rhinoceroses it should have become evident that the horns, which nowadays form such an outstanding feature of these animals, were quite slow to appear. The horn of a rhinoceros is, of course, not comparable with the horns of ruminants such as cattle, or with the antlers of deer. The latter consist entirely of bone, the former have bony cores, which spring from the frontal bones and are covered with a horny sheath. The rhino's horn, on the other hand, is entirely an outgrowth of the skin, consisting of closely packed, agglutinated fibres. It is therefore not attached to the skull, but held in place by the thick skin surrounding it, the slightly hollowed out base fitting over a slight prominence of the nasal bones. The bone surface immediately underneath the horn is rugose in appearance. A patch of rugosity on a fossil rhino's skull can be considered as a definite indication that the species in question did carry horns. In hornless rhinoceroses, like the *Baluchitherium* and most of the *Aceratheres*, the bones are perfectly smooth. In those *Aceratheres* which had a small horn on the forehead, there is a rugose spot close to the union of the frontal and nasal bones.

Among the first horned rhinos we can count the *Diceratheres*, which appeared in North America during the Oligocene, and later spread to Eurasia. They had two horns, but these stood side by side, not one behind the other. Each foot had three toes, but in other respects the *Diceratheres* were still very primitive, about the size of tapirs, and similar in build to the early *Aceratheres*. These first two-horned rhinos became extinct during the lower Miocene.

While the *Aceratheres* and *Caenopenes* were long-legged animals, swift and agile in their movements, some of their offshoots developed heavy, barrel-shaped bodies which were carried on short, stumpy legs. They probably took to the water and lived very much like hippos, wallowing in swamps or shallow rivers and sunning themselves on sandbanks. There were several groups of these aquatic or semi-aquatic rhinoceroses which had no very close family ties amongst each other. The *Amynodonts* originated in North America and spread to Asia, while the *Brachypotheres* appeared in Europe, probably as descendants of the *Aceratheres*. They have often been linked with the American *Teleoceres*, but it is now

thought that the latter came out of the *Caenopenes*. *Teleoceras fossiger* from the lower Pliocene of Kansas was described by Osborn as a broad-headed, short-limbed rhinoceros, ten feet long, only a little over four feet in height at the withers, and with a girth of nine feet two inches – certainly one of the most weirdly proportioned mammals that ever existed! The male carried a tall, thin, wedge-shaped horn, while the nasal ornament of the female was of only modest size.

One branch of the rhinoceros family tree which probably had its origin in the Miocene period, ended in the enormous *Elasmothere*, which had a head over three feet in length, longer, in fact, than the head of the present-day white rhino. A big, bony prominence in the centre of the forehead makes it probable that this animal was armed with a huge horn, in which case it would have looked like a monstrous unicorn. The *Elasmothere* occurred in Siberia and southern Russia during Pleistocene times, but passed out of existence before the end of the Ice Age.

We now have to move to northern India, to a chain of low hills that runs parallel to the foot of the mighty Himalayan range. These hills, the Sivaliks, are a palaeontologist's dream come true, their strata being crammed with an enormous assortment of animal remains. Many expeditions from Europe and America have dipped into this inexhaustible scientific treasure trove, their spades unearthing the bones of primates, antelopes and wild oxen, of three-toed and one-toed horses, of camels and moose-like members of the giraffe family and – last, but not least – of rhinoceroses.

Not so many decades ago the Indian rhinoceros, *Rhinoceros unicornis*, could still be found close to the Sivalik hills, while its smaller cousin, the Javan rhinoceros, *Rhinoceros sondaicus*, occurred not so very far away in Assam and Bengal. It was therefore highly satisfactory from the evolutionist's point of view, when the Sivalik rhinoceroses turned out to be the direct ancestors of the two one-horned Asian species.

Gaindatherium browni – *Gainda* being the Hindustani word for rhinoceros – from the lower and middle Sivalik strata seems to have developed out of the primitive *Caenopenes*. It led to such Pleistocene species as *Rhinoceros sivalensis* and *Rhinoceros palaeindicus*, which in their turn, gave rise to the two present-day one-horned rhinos mentioned above. Of the two, the Javan rhinoceros is the more primitive. It appeared in the upper Pleistocene and has undergone no changes since then. A 'living fossil' in the truest sense of the word. Like so many other primitive mammals, it is a forest dweller and has the short-crowned grinding teeth of a typical browser, as might be expected from its choice of habitat. The grinding teeth of the Indian rhinoceros have longer crowns, and the animal is in fact more a grazer than a browser, inhabiting savannahs and swampy areas. Both species have two cutting teeth in the upper and four in the lower jaws; the inner lower cutting teeth are small, the outer ones large, pointed and projecting forward, so that they are kept sharp by grinding against the upper incisors. There are four premolars and four molars in each jaw.

Having dealt with the evolution of the one-horned rhinoceroses, we must now return to the Oligocene period, to pick up the thread leading to the two-horned species. We have already become acquainted with rhinos that carried two horns standing side by side. In the lower Miocene strata of France there occur small rhinoceroses, only as big as tapirs, which were armed with horns arranged tandem fashion, one behind the other. They can be regarded as direct descendants of an even smaller species, *Dicerorhinus tagicus*, which lived in Oligocene times. All these animals were probably forest dwellers but, at the beginning of the Pleistocene, some adapted themselves to life on the open plains. Merck's rhinoceros, *Dicerorhinus etruscus*, was one of these grassland species, while the famous woolly-haired rhinoceros, *Coelodonta antiquitatis*, became an inhabitant of tundras and coniferous forests of ice age Europe and Siberia. Of all the extinct rhinoceroses, the latter is by far the best known. Carcasses have not only thawed out of the frozen soil of Siberia, but were also extracted in a perfect state of preservation from oil seeps at Starunia in Galicia. In addition there are life-like paintings and drawings done by stone-age men who knew, and most probably hunted, this animal. There is a wonderful portrait of this rhinoceros done in red colour on the wall of the cave of Font-de-Gaume in the Dordogne.

The woolly-haired rhino, whose remains are always found in association with those of the mammoth, was about twelve feet long and stood six feet high at the withers. Its body was covered with long, coarse hair

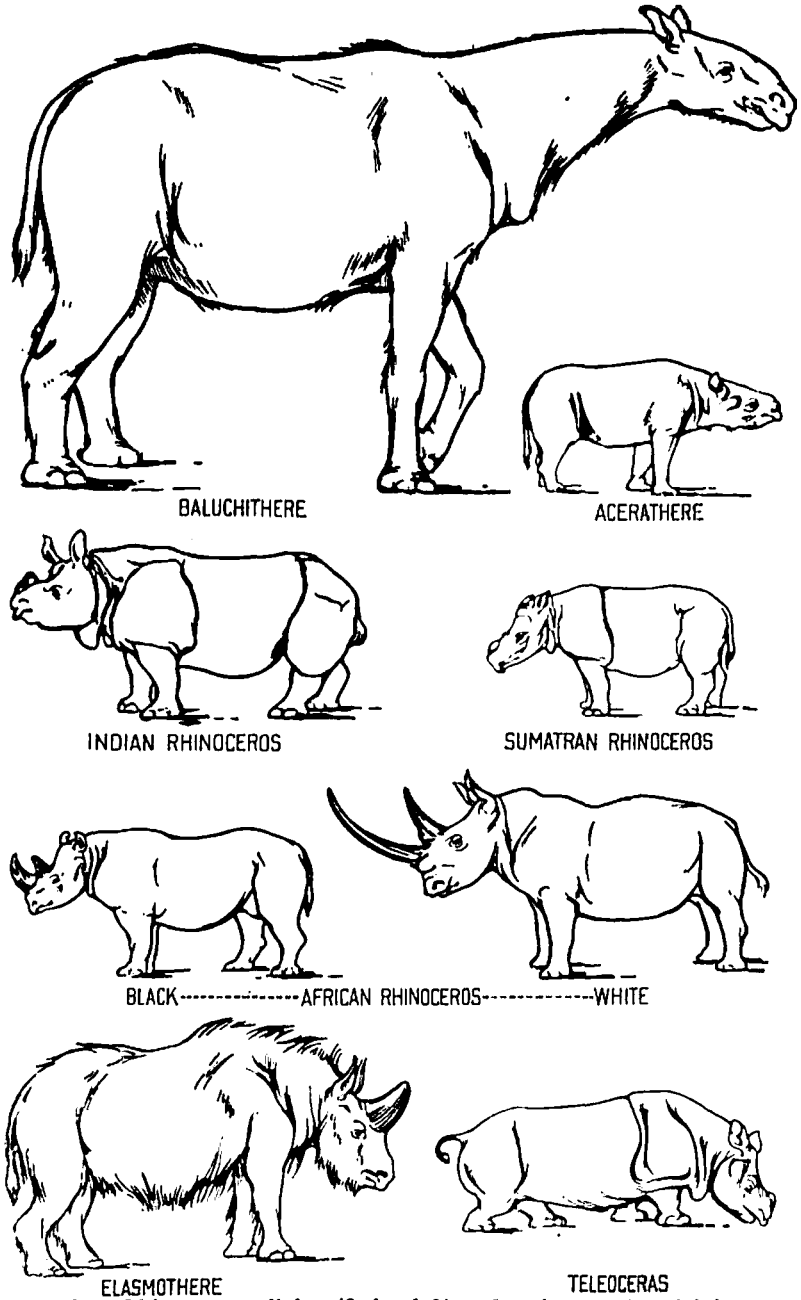


Fig. 1 Rhinoceroses, living (facing left) and extinct (facing right).

and a thick, woolly undercoat of golden-brown colour. In the carcasses found at Starunia the hairs have disappeared, but a close examination of the skin shows without any doubt that they had the same type of coat as the Siberian animals. The densest covering seems to have been on the shoulders, perhaps forming some kind of a mane, similar to that of a wild boar. The painting of Font-de-Gaume does in fact quite definitely create the impression of the presence of such a mane. The anterior horn was up to three feet six inches long and very thick in male specimens. The natives of Siberia formerly thought that these horns, which are very frequently found, originated from gigantic birds.

The head was carried at a similar angle to that of the present-day white rhinoceros, which the woolly-haired rhinoceros also resembled in having long-crowned grinding teeth and no incisors. Many authorities have assumed the two to be closely allied species, but it is now thought that the resemblance was brought about through adaptation to somewhat similar habitats and has nothing to do with close relationship.

The ice age rhinoceros may have fed on herbs and grasses for a considerable part of the year, but willow leaves and bits of coniferous twigs have been found between the teeth of frozen specimens. The animal can thus not have been such an exclusive grazer as the white rhino. When the ground was deeply covered with snow, it most likely retreated into the forests, where it had to get its food mainly by browsing.

Most of the *Dicerorhines* remained faithful to their original habitat, and during the upper Pleistocene they appear to have been very common throughout a forest belt that extended from the east coast of England across southern France and northern Italy to India. As far as evolutionary development is concerned, these forest rhino remained behind their cousins who had ventured forth into the steppes and tundras, and the one surviving species, the two-horned Sumatran rhinoceros, *Dicerorhinus sumatrensis*, is both the smallest and most primitive rhino alive today. Its grinders are short-crowned, and there are two cutting teeth in the upper and lower jaws, the lower pair being lateral, large and pointed. This animal has come to us practically unchanged from the Tertiary Age, another 'living fossil', very much older than our own species *Homo sapiens*.

The branch leading to the woolly-haired rhinoceros was not the only one to split off from the more conservative *Dicerorhines*. Some tandem-horned rhinos actually parted company with the main body of small forest-dwellers very much earlier, probably around the transition from Miocene to Pliocene, moving into Africa and going their own evolutionary ways. They lost their cutting teeth. This not only brought about a shortening of the lower jaws, but also a reduction of the premaxillary bones in the upper jaws to a point where they became functionless. There being no more sharp-pointed tusks available for defence, the horns took on the function of weapons, and this caused a strengthening of the nasal bones supporting the anterior horn.

Some of these African rhinos developed a pointed, prehensile lip for browsing, retaining at the same time their short-crowned grinders, while others acquired broad grazing-lips as well as long-crowned cheek teeth. Both types have survived to this day in the prehensile-lipped or black rhinoceros, *Diceros bicornis*, and the square-lipped or white rhinoceros, *Ceratotherium simum*.

Some taxonomists do not consider the two species as sufficiently different from each other to merit inclusion in separate genera, and prefer to accord *Ceratotherium* subgeneric status only. If we accept this dictum, the scientific name of the white rhinoceros would be *Diceros* (*Ceratotherium*) *simus*. Whatever name we give it, there is no doubt about it being the more highly evolved and more specialized of the two.

Apart from Australia and – as far as we know at present – South America, rhinoceroses have roamed over the whole world, ranging from the Arctic coasts of Asia and north America to the islands of the Malay Archipelago and to the southernmost tip of Africa. They succeeded in adapting themselves to all kinds of conditions, and we do not know why so few species only were able to struggle on into our times. The case of the rhinoceroses has been aggravated by the fact that man has long hunted them, at first for meat, then for sport and now purely for gain. The sad part is that superstition credits their horn with magical aphrodisial and sexually rejuvenating powers. It is to satisfy a black market in rhino horn that they are now being pushed to the edge of extinction.

3 The Black Rhinoceros

Ever since Albrecht Dürer produced his famous woodcut of the Indian rhinoceros that was on show in Lisbon in 1513, the people of Europe had a definite image of the strange, horned monsters as animals clad in some kind of armour which neither spear nor bullet could penetrate. Travellers and naturalists visiting the Dutch settlements at the Cape of Good Hope in course of the seventeenth and eighteenth centuries were amazed to see rhinoceroses of an entirely different kind. Peter Kolb, who spent several years at the Cape, gave an account of the 'renoster', as the Dutch settlers called the animal, in a book published in 1731, and apart from a few hunters' tales, to which he listened with rather too much credulity, he recorded a number of facts which later proved to be perfectly correct. He gave the following description: 'The painters represent him as arm'd all over with a sort of scales. He has got no sort of scales upon him; but instead, the numberless sores and scratches which intersect one another on his hide, make him look at a distance, as if he was fenc'd with scales . . . Upon his mouth grows a horn of a dark grey and somewhat bent, in the manner of a plough share . . . On his forehead, in a right line from the horn on his snout, grows another horn.'

Kolb's publishers cannot have read this paragraph very carefully, for the illustration of a rhino they provided is a simple copy of Dürer's woodcut, complete with armour plating scales and a single horn!

During the seventeen-seventies, Andrew Sparrman, a very competent Swedish naturalist who had accompanied Captain Cook on his second voyage of circumnavigation, made a long journey into the eastern parts

of the Cape Colony, where he not only saw live rhinoceroses, but had an opportunity to draw, measure and anatomize a couple of freshly killed specimens. 'What quite especially attracted my attention,' he wrote, 'was the fact that the skin of these animals did not possess the deep folds usually shown in representations of the two-horned rhinoceros, which give it the appearance of wearing armour.' In his book, Sparrman did not only give an excellent and detailed description of what was then the only species of two-horned rhinoceros known to science, but also added a very reasonable copper-plate depicting *Rhinoceros bicornis*. This did not prevent artists for many years to come from putting two horns on the nose of an Indian rhinoceros, whenever they were asked to draw the African animal!

In Sparrman's time scientists were not at all sure how they should classify the rhinoceroses. Having spent many hours dissecting a rhino shot by one of his companions, Sparrman remarked quite rightly: 'As far as I could see the viscera of the two-horned rhinoceros resembled those of a horse. We can thus be sure that it does not belong to the ruminants.'

The colour of the skin he called ash-grey, being much lighter, almost like human skin, on the under-parts. The 'black' rhinoceros is, in fact, no more black than the 'white' rhinoceros can be described as white. 'Varying from yellowish-brown to dark-brown' is one modern author's opinion, while another one prefers 'deep neutral-grey to blackish-brown'. On the belly and the underparts the colour becomes lighter, turning to whitish about the groin. When you meet the prehensile-lipped rhinoceros in its native surroundings, the colouring depends very much on the ground on which the animal lives. I have seen almost coal black rhinos on the lava soil of Ngorongoro Crater; rhinos much whiter than any square-lipped 'white' rhino in the Amboseli Reserve, and brick-red ones in certain parts of the Tsavo National Park.

Except for the eyebrows, two lines of hair on both sides of the tail uniting into a terminal tuft and fringes on the ear trumpets, the skin is completely hairless. There is a fold on each foreleg, another one across the nape, just behind the ears, while the flanks show a whole series of parallel, rib-like folds, which are sometimes very indistinct. The upper

lip is drawn out to a prehensile point, giving the mouth a beak-like appearance, reminiscent of a tortoise.

As has been mentioned in the previous chapter, the black rhinoceros has, in course of its evolutionary history lost all cutting teeth, and its dentition consists merely of four premolars and three molars in each jaw. The first molar is often small, sometimes missing, especially in older specimens. The grinders are broad-crowned and have two transverse folds which project inwards. There is no cement filling the valleys between these folds.

Colonel R. Meinertzhagen has published the weights and measurements of no fewer than sixteen Kenya rhinos. Eleven bulls varied in shoulder height from 4 feet 9 inches to 5 feet 3½ inches, in length from 10 feet 11 inches to 11 feet 8½ inches and in weight from 2,364 to 2,896 lb. In five cows the respective figures were: 4 feet 10½ inches to 5 feet 2 inches, 10 feet 8 inches to 11 feet 8 inches, and 2,199 to 2,812 lb. There are reliable records of shoulder heights up to 5 feet 7¾ inches and 5 feet 8¼ inches. Quite possibly southern Africa may in former times have produced somewhat larger specimens than East and Central Africa.

The horns vary greatly in length and in shape, so much so, that the natives of Bechuanaland used to distinguish two different kinds of black rhinoceroses, the 'borèlé' with the front horn longer than the back one and the 'keitloa' in which the horns were of about equal length. They also spoke of two white rhinoceroses. Among the European hunters and explorers, Cornwallis Harris and Livingstone immediately took the correct view that there were only two species, the black and the white. Gordon Cumming, too, considered the various animals the Bechuanas had given names to as mere varieties. Many authors, however, thought them to be proper species, even crediting the 'borèlé' with having a much more vicious temper than the 'keitloa', and zoologists went so far as to give all of them different scientific names. The myth of the four species of African rhinoceroses was finally destroyed only in 1881, when F. C. Selous, that greatest of hunter-naturalists, submitted a paper to the Zoological Society, in which he stated: 'In those portions of Southern and South Central Africa in which I have hunted, I have only met with

two true species of rhinoceroses, namely the large, square-mouthed, grass-eating species, and the smaller, prehensile-lipped rhinoceros, which feeds exclusively on bush.'

Selous' paper should have made taxonomists a bit more careful about naming new species. But when a very long and thin rhinoceros horn was brought to Europe from East Africa by a Mr Holmwood, somebody promptly created a 'Rhinoceros holmwoodi'. This was later demoted to a subspecies – *Diceros bicornis holmwoodi* – supposed to be a forest-inhabiting race of the East African black rhinoceros. This long-horned forest rhino led a ghostly existence even after Roosevelt and Heller, in their *Life Histories of African Game Animals*, had declared the subspecies to be invalid. Nowadays we know that long, thin horns of the holmwoodi type can also occur in open country. Gladys and Gertie would most certainly have qualified for inclusion in this subspecies, and the same applies to Longhorn, the son of Gladys, and to several other Amboseli rhinos.

Not all descendants of Gladys and Gertie have long, thin horns, however. There is another genetic strain running in the family, which produces gradually tapering horns of normal length and with a fairly strong backward curve. Pixie's horn is of this type, and is characteristic of several bulls and cows related to the famous pair.

I cannot remember ever having seen a rhino with horns of equal length – the keitloa type of the old South African hunters – around Observation Hill, but I know three keitloa cows within an area of not much more than one square mile about three miles north-east of Observation Hill.

It has often been put down as an invariable rule that males carry shorter and very much thicker horns than females. This may be quite true in a general way, but the Amboseli bull I have named Longhorn is proof enough that it does not always apply. Pixie's front horn is as long and slim as the horns of his sisters and half-sisters. The many variations we notice in rhino horns are quite obviously governed by genetic strains and show family relationship. They cannot, therefore, be used as a means of identifying species or subspecies.

Gertie's horn was about forty-eight inches long, and Gladys originally

carried a horn that was quite a bit longer. Both of these animals thus stood high in the record class. The longest front horn which figures in Rowland Ward's *Records of Big Game* is fifty-three and a half inches long and comes from Kenya, but C. G. Schillings mentions buying a fifty-four inch horn in Zanzibar. The vast majority of rhinos have, of course, much shorter horns, the shortest still included in the *Records* being twenty-seven inches long. D. Lyell, a well-known big game hunter, considered twenty inches as a good average. The longest rear horn mentioned by Ward is one of thirty-two and a half inches from Tanganyika. The horns have a rounded base, but the sides of the rear one are flattened towards the point, often having sharp edges front and back.

I have mentioned Pixie, the earless rhino of Amboseli, growing a third horn. This is by no means unique, and three-horned specimens have been reported from various parts of Africa. When Pitman made a survey of northern Rhodesia, he found that a regular strain of such animals had persisted for some time in the vicinity of Lake Young. In one case the extra horn had a length of five and threequarter inches, another one measured three inches. There is a record of a five-horned rhino, the three additonal horns coming from the bases of the normal ones. This deformity might possibly have originated through some damage to the horns early in life.

In the collection of the Kenya Game Department there is a three and a half inch horn which grew on the side of a rhino's rump, and two shorter ones that came from another animal's flanks. The occurrence of such secondary skin horns should be of considerable interest to art historians, for Albrecht Dürer put a tiny little horn on the neck of his Indian rhinoceros. This has usually been presumed to have been a case of artistic licence, but the animal which was sent to the King of Portugal might very well have had such a growth.

While we can definitely rule out shape and length of the horns as taxonomic characters, zoologists are still inclined to accept the small rhinoceros from northern Kenya, Ogaden, and the Somali countries as a subspecies, calling it *Diceros bicornis somaliensis*. On their expedition to Lakes Rudolf and Stefanie, Count Teleki and Lieutenant von Höhnel had to shoot rhinoceroses in order to feed their hungry porters. After

having crossed the Equator and reached about latitude 1° 30′ north, the explorers found that one rhino did not go as far as before, because the animals they now encountered were about one third smaller than the ones they had killed further south. Other travellers and hunters have commented on this difference in size. For a bull from near Lake Rudolf Arthur A. Neumann gives a shoulder height of 4 feet 9 inches and a length of 9 feet while a bull shot in Ogaden by Drake-Brockman stood only 4 feet 6 inches at the shoulder and was 10 feet 8 inches long. It has been stated that the skulls of these small animals have a flatter outline than the skulls of most other black rhinos, the occipital crest being less elevated. In addition, the colour of the skin is said to be somewhat lighter and the fringes of hair on the tips of the ear are supposed to be shorter.

Another small, high-legged rhinoceros with a flat skull has been described from South West Africa, and more especially from the Kaokoveld and the Kunene River area. It was first named *Opsiceros occidentalis*, but if considered valid at all, it should be referred to as *Diceros bicornis occidentalis*.

The black rhino's eyes are small, the nostrils wide and flaring, the ear trumpets large. No doubts exist regarding the acuteness of the black rhino's sense of smell – all authors agree on that point, and anybody can easily convince himself of the fact that a rhino's world is first and foremost a world of innumerable odours. I have seen one of these animals standing for a quarter of an hour, intently sniffing the breeze that blew from where, about 300 yards away, twelve lions were devouring a zebra. A bull in Ngorongoro Crater quite definitely had the wind of some lions a good half mile away.

A rhino can scent a spoor exactly like a dog. Following Gertie and her calf across a stretch of open, sandy ground, I saw both animals stop and sniff the track of another rhino that had walked across the plain a few hours earlier. Later, close to the swamp towards which they were heading, the spoor of an elephant came in for a prolonged examination. On another occasion, I watched a bull following a cow, the animals trotting towards a patch of dense bush. While the cow disappeared from sight, the bull stopped to defecate. Afterwards he put his nose to the ground, cast around for the female's scent and as soon as he found it, he swung around and followed her into the bush.

There is equal unanimity on the subject of the black rhino's eyesight. As Carl Akeley put it: 'He probably sees "man as trees walking", only vague shadows at twenty or thirty paces.' The animal is, in fact, terribly short-sighted. Akeley thinks that its range of vision does not exceed fifty to sixty yards, Stigand limits it to thirty-five yards, Maberley even to as little as fifteen yards. I have some evidence to show that another rhino is not recognized by sight at about fifty yards. On one occasion, when Longhorn and his two cows were disturbed by a car, the females walked off in one direction, the bull in another. He suddenly noticed that he had lost contact with his companions and became very agitated. In great excitement he ran around, searching for their scent, even though they both were in full view, not more than fifty yards downwind. As soon as he hit their spoor, he followed it at a trot, his nose practically on the ground. His head only went up again when he rejoined the cows. It may be that young rhinos see better than adults, but no definite evidence seems yet available on this point.

How much does a black rhino rely on its sense of hearing? The large ear-trumpets are in almost continuous motion, turning independently of each other, now this way, now that, even when the animal is asleep. When a rhino is facing you without being able to get your scent, the ears are directed forward, obviously straining to catch the slightest sound. I have seen rhinos react promptly to a variety of noise, being considerably alarmed by a low cough or the rustling of a plastic bag used to protect camera lenses from dust. My personal experience leads me to suspect that their sense of hearing is well developed. I am sure that they depend on it a great deal whenever the sense of smell fails them owing to contrary wind.

From the top of a high rock in the Tsavo National Park I once watched a rhino coming to a water hole. It seemed to have covered a considerable distance and walked in an almost straight line until it finally stood with its forefeet in the shallow pool, lowered its head and drank. From time to time it lifted its nose to sniff the air. I was much too far away from the animal to see me, nor could it possibly have got

my scent. After about five minutes I heard a strange, humming sound and realised that this was caused by an approaching whirlwind. The dense bush covering the country prevented a 'dust devil' from forming – there was only the noise. The rhinoceros reacted at once. It spun around and went off at a fast trot, its tail up over its rump; not once did it slow down as long as I was able to follow its course with my glasses.

That rhino was as thoroughly alarmed by that rather weird but by no means loud sound as it would have been by a whiff of human scent reaching its nostrils. The way it took off was a good example of how timorous the big animals really are. However dull and phlegmatic they may appear they are easily frightened. Rhinos are apt to 'take fright' on the very slightest provocation.

Seeing Gertie and her calf feed on coarse, dry grass, and chewing big tufts which hung out between their lips, I was keen to get some photographs which would show black rhinos grazing, and not browsing, as is their usual habit. In manoeuvring the Land-Rover around some bushes we put up a spotted hyena which went loping straight towards the rhinos and gave them a real scare. The two big animals were so alarmed that they literally ran in circles, and it took them several minutes to regain their mental equilibrium.

If you come across a rhino that is standing some distance away, the animal usually faces you for a while, its nose in the air. It will probably nod its head in an ungainly fashion, or swing it from side to side. Very often it then turns around, trots some way, circles back towards you to face you for another minute or so and then runs on. This performance is repeated until it reaches cover. But your rhino may just as well come towards you, either slowly, a few nervous steps at a time, or at a smart trot. Once it has got near enough to satisfy its curiosity, it spins round and gallops away. People tell you the most harrowing stories of rhino charges when, in truth, all they experienced was such an exploratory advance.

The more you know about animals, the less you are inclined to be dogmatic what they will 'always do' or 'never do', and this applies most particularly to the black rhinoceros.

Years ago Rosanne and I accompanied some American friends into

Ngorongoro Crater. We were actually the third or fourth party to descend into this spectacular caldera by car, and we were looking for rhino. After a long search we found one asleep in open grassland. At first there was some discussion as to whether the object we were looking at was really a rhino or only a black lava boulder. A twitching ear soon dispelled all doubts, and, as we drove nearer, some oxpeckers flew up screeching. The animal, a bull with short, massive horns got up very fast. The way he turned towards us made us expect an immediate charge, especially as we knew that the Ngorongoro rhino had not yet become conditioned to cars. The ground was favourable, we could easily have got out of his way, and our friends, hoping for some exciting film, shouted and waved at him. But there was no charge. The bull turned away and walked off at a very leisurely pace. We followed and finally drove along close beside him. He kept his temper in a most exemplary manner, never made the slightest hostile movement in our direction and never increased his speed. He simply went on his way as if we did not exist, and we could take as many pictures of him as we wanted.

Somebody had meanwhile spotted another rhino quite a distance away and, after having parted from our 'tame' bull, we went to have a look at it. We were still several hundred yards from that animal when it fell into a fast trot and ran away. Without stopping even once it sped right through the big herds of wildebeeste and zebra and disappeared into a distant swamp.

On another drive through Ngorongoro Crater we came upon a sleeping rhino which we had not been able to see in the high grass. The animal suddenly jumped to its feet about thirty yards from the car and charged without a moment's hesitation. We took evasive action, and the animal missed the Land-Rover by not more than a couple of yards. This rhino might, of course not have attacked at all, had its slumber not been so rudely disturbed by a noisy monster passing nearby.

In the forest of Mount Meru in northern Tanganyika I once walked along a well-trodden game trail which, following the side of a steep incline, led down into the bottom of a ravine. It had been raining, the ground was soft and slippery, and there were fresh rhino tracks on the path.

Approaching a big clump of bush, my ears suddenly caught dry, snapping noises which could mean only one thing: there was a rhino behind that bush, biting off twigs. I stopped in my stride and signalled to the two friends behind me. We all three started to climb up the slope, hoping to catch sight of the browsing animal over the top of the massive greenery. Next moment the rhino came charging full tilt around the bush and up the game track. Luckily the ground was very soggy. A few yards from us, the snorting attacker slipped and rolled right over, while we scrambled wildly for safety.

I do not know how that rhino got to its feet again and what it did afterwards. We daren't look back until we reached the top of the slope by which time our lungs were almost bursting – we were at an altitude of about 7,500 feet. But by then the rhino had disappeared. I afterwards heard that while descending to one of the farms at the foot of the mountain four or five months before, this animal had been badly wounded by a spear thrust. It could certainly not be blamed for objecting most strongly to our intrusion into its hidden valley!

From such incidents it becomes clear that you can expect a sudden charge from a rhino you stumble upon without giving it a chance to get its bearings, especially if you inconsiderately disturb its pachydermous dreams. An animal that has been harassed and perhaps even wounded by humans, will almost certainly charge. A sexually excited bull may possibly take the dark mass of an approaching car for a rival and go for it.

I must admit, however, that my car has been charged at a gallop from as far as 150 yards away, and that, too, in reserves where I knew the rhinos to be reasonably free from molestation. Incidentally, a black rhino begins its charge with the head held high and only lowers the horns when it is fairly close to its target.

In view of its unpredictable nature and its sometimes panicky and often blundering reactions it's not surprising the black rhino has a bad name. It's probably had one ever since when in 1685, Governor van der Stel's travelling coach was attacked and upset by one of these animals near Piketberg, eighty miles north of Cape Town. In the early days, such events were recorded again and again. East of the Limpopo, a 'borèlé'

charged David Livingstone's trek waggon and smashed the explorer's iron baking pot. Most of the early East African explorers and hunters had stories to tell of rhinos charging madly through their caravans, of boxes with precious equipment crashing to the ground, while porters scattered in all directions and shinned up trees. No wonder that many of the blundering giants were shot by irate travellers.

Some of these early explorers were run down and badly injured in unprovoked charges. This happened to Lieutenant von Höhnel, co-discoverer of Lakes Rudolf and Stefanie, when he took part in a second expedition to northern Kenya as the companion of William Astor Chanler. Von Höhnel could not shoot at the animal which burst out of the bush near the Uaso Nyiro River. The porters had run across his line of fire. Nor could he jump aside, being hemmed in by thick scrub. The animal's nose hit him in the stomach bowling him over. The next moment the rhino trampled on him and lunged at him both with the nose and horn. When Chanler came to the rescue, he found von Höhnel with a deep gash in his thigh, which made a return to civilization imperative. The explorers had not yet finished with rhinos, however, for Chanler tells us that on the march from the Uaso Nyiro to the Chombeni Hills more than one hundred of these animals were seen, of which no fewer than twenty-five charged the caravan, often endangering the litter in which the wounded man was being carried. Fortunately, no complications set in, and von Höhnel was well on the way to complete recovery, when the expedition got back to the coast.

Following an old elephant path in high grass, Captain C. H. Stigand, the great hunter, explorer and administrator, came upon a freshly beaten down lane where some big animals had walked. He bent down, parting the grass, so as to be able to see the foot prints underneath it. An outburst of snorts close by left Stigand in no doubt as to the owner of the tracks. Two rhinos had got his wind and came galloping through the grass. 'The next moment a great behorned head burst out of the grass a yard or two from me,' writes Captain Stigand in his vivid account, 'I had no time to think, but just shoved my Mannlicher in his face and pulled the trigger. He swerved, but I do not know what became of him after that, as at the same moment I became aware of the second

one bearing down on me from my left. There was no time to reload, so I tried to jump out of his path, with the usual result in thick stuff, that one tripped up. He kicked me in passing, and then, with a celerity surprising in so ponderous a creature, he whipped round, and the next moment I felt myself soaring up skywards. I must have gone some height, as my men on the elephant track said that they saw me over the grass, which was ten or twelve feet high. However, they are so very unreliable in their statements, that it would be quite enough for them, if they had heard what had happened, to imagine they had seen it. Anyhow, I fell heavily on my shoulder blades, the best place on which it was possible to fall, partly by accident and partly from practice in tumbling in the gymnasium. On looking up I saw the wrinkled stern of the rhino disappear in the grass, at which I said to myself, hurrah! for I thought that he might continue the onslaught.'

Dazed and badly wounded, Stigand walked to the nearest village and sent to Fort Manning for help. A European official and an Indian hospital assistant came out in a forced march and patched him up with such success that three weeks later he could start on a 240 mile safari!

Despite such encounters, the black rhino has often been made out to be much more of a monster than he really is. Selous, who met a lot of these animals in his life-time, did not consider them especially dangerous. He wrote in one of his books: 'These animals, after first trotting quickly towards me, would stand, looking intently at what must have been to them the unaccustomed sight of a figure with a shirt and a hat on it, then snort again, and trot up nearer; but with one exception they always turned round and trotted off sooner or later, carrying their heads and tails high in the air. Sometimes I had to shout and throw sticks and stones at them before they wheeled round and made off.'

A. Radclyffe Dugmore, the great naturalist and pioneer camera hunter, who took splendid photographs of black rhino years before the First World War, made the following remarks with respect to these much maligned animals: 'When charging they usually lack the fiendish persistence of such animals as the buffalo, and if they fail to strike the object of their ponderous attention the first time, they are more than likely to pass on. Frequently their so-called charges are not charges at all. They

see, hear or smell something, and, to satisfy their curiosity, come to see what it is.'

This does not sound like the 'vicious brute, given to paroxysms of fury', as the black rhinoceros has so often been depicted!

Sportsmen like Selous, Jackson, Neumann, Stigand and Gromier have made it abundantly clear in their writings, that a rhino can be killed very easily and that there is no special glory attached to such a feat. Their opinion is borne out by the fact that enormous numbers of rhinoceroses have been shot with very few accidents to the men involved in this slaughter. Cases of hunters not being able to stop or divert the charge of a wounded rhino, or failing at least to get out of its way, are very rare, and can usually be put down to inexperience or sheer bad luck. In all the years he spent in southern Africa, Selous never heard of a European or Boer hunter being killed by a rhino. There have been a few accidents in East Africa. Thus Schillings mentions a Dr Kolb, who shot over 150 rhino – one wonders what for – and who was finally killed by an animal he had wounded.

I expect that the reader has by now taken the point that black rhinos, even though they may blunder along blindly, are by no means as clumsy and ponderous as they look. In truth, they can get into full stride very quickly. They twist and turn with amazing agility, and over a short distance they attain quite a considerable speed. I once timed a rhino galloping behind my car at between thirty and thirty-two miles per hour. This agrees well with the figures given by Colonel Meinertzhagen. He quotes speedometer readings of 28·35 m.p.h. and 32 to 35 m.p.h. for rhinos charging cars and 27·2 m.p.h. for an animal trotting after a man. Robert Foran mentions a rhino that kept up for a quarter of a mile with a car travelling at 28 m.p.h., while another one was paced at 35 m.p.h., going down a slight incline.

As a rule, however, a rhino's movements are very sedate and unhurried. At Amboseli I have often followed these animals on their daily rounds – feeding, going to or coming from the water, heading for a patch of bush in order to settle down for a few hours' siesta – and most of the time they did not walk at a greater speed than one to two miles an hour. The way they slowly and deliberately put one foot before the other –

left hind, left fore, right hind, right fore – looks almost comical. If a rhino is forced to cover a long distance or if it has some urgent business to attend to, it can, of course, considerably speed up its walk. Changing its gait to a trot, it may not look the picture of grace, but there is a certain amount of elastic elegance as it lifts each pair of diagonally opposed feet, having the left fore and the right hind, the right fore and the left hind in the air more or less simultaneously. Its fastest gait, is, however, a full-blooded gallop. While trotting, the tail is lifted and sometimes bent forward, in full gallop it is twisted over the rump like a pig's tail.

Black rhino are not only agile, but also very sure of foot, and do not hesitate to take up residence in hilly country. They are commonly found in the mountains of East Africa and have been recorded up to 10,500 feet on Mount Kenya and at about 9,000 feet on the north side of Kilimanjaro. Rhinos do not seem to frequent the wet south side of the latter mountain.

At one time these picturesque animals were very widely distributed throughout the length and breadth of Africa. In 1653, when Jan van Riebeck established the Dutch settlement that was to become known as Cape Town, black rhinos roamed over the Cape Flats and wandered along the lower slopes of Table Mountain. From the Cape, the species ranged into southwestern Angola and over the whole eastern half of the Continent as far as Somaliland, parts of Abyssinia, and Kassala in the Sudan. To the north of the Equator rhinos could be found westwards to Lake Chad, northern Cameroon, Bornu, the farthest known point of their occurrence in that direction being the northern regions of the Ivory Coast and a point on the River Niger, west of the town of Niamey. The rhino never penetrated the dense rain forests of the Congo Basin and along the West Coast.

Not so long ago black rhinoceroses were exceedingly common in many parts of this enormous range. In the mid-thirties of the last century, Cornwallis Harris met with great numbers in the valley of the Limpopo River, and William Cotton Oswell saw them continuously on his numerous expeditions into what is now Bechuanaland, which he undertook between 1844 and 1852. Charles Andersson shot scores in

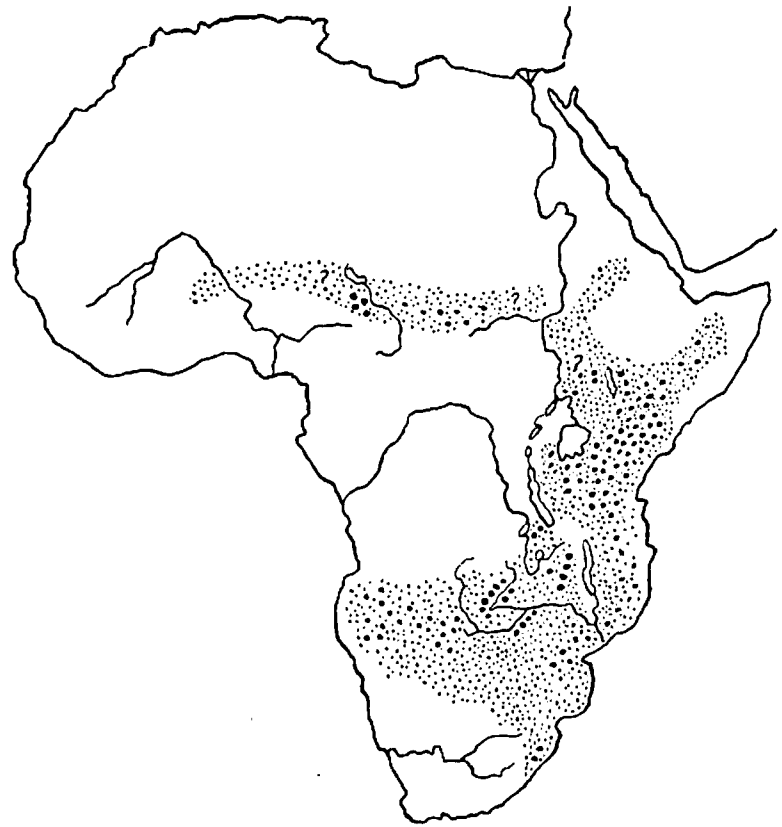


Fig. 2. **Black Rhinoceros** (*Diceros bicornis*)

Former Distribution (*c.* 1850)

Present Distribution

? Unconfirmed Reports

South West Africa and in Ngamiland, while Selous found the species well represented in Matebeleland and Mashonaland.

Today the picture has sadly changed, and there are very few black rhinoceroses left south of the Rivers Zambesi and Kunene. In the Orange Free State the last one was shot as as early as 1842. In 1851 there was just one individual left in the Addo Bush, where elephants and buffaloes have survived to this day. One which was shot about that time on the Coega River near Port Elizabeth was probably the very last rhino of Cape Colony. The Kruger National Park was established too late to save the black rhinos of the Bushveld, which had still been very numerous in 1873. A few lingered for a time within the park boundaries, but no tracks have been seen since 1940.* In Natal there are at present over 300 black rhinos in the Hluhluwe Reserve, thirty to forty in the Umfolozi Reserve and about fifty in the Mkuzi Reserve. The number of those surviving in the Kaokoveld of South West Africa was estimated at no more than forty to eighty as long ago as 1934. A few are still to be found in the Caprivi Strip, as well as in northern Bechuanaland and in southern Angola. For a time two were roaming about in the Wankie National Park of Southern Rhodesia, but a few years ago one of them left the reserve and had the bad luck to be hit by a train, while the other was probably killed by Bushmen poachers who had come over from Bechuanaland. The only place in Southern Rhodesia where black rhino can still be met with seems to be the southern bank of the Zambesi in the Kariba Dam area, where they have recently been reported as fairly numerous. There are some still existing in Portuguese East Africa.

In Northern Rhodesia (Zambia) the species survives in the Kafue National Park and adjacent areas, in the Luangwa and Luano Valleys, in a few places along the Zambesi, in Lavushi-Manda, and in the northern Mporokosa District, between Lakes Mweru and Tanganyika. Numbers for the whole country hardly exceed 1,000, of which about 350 are in the Luangwa Reserve, 150 more in the rest of the Luangwa Valley. It seems unlikely that there are any rhinos in Nyasaland

* Four black rhinoceroses caught in the Umfolozi Reserve were released in the Kruger National Park in September, 1961.

Gertie browsing.

Black rhinos: Gladys (with ear hanging down) with a calf and several former children.

'I managed to get a close-up photograph showing a black rhinoceros with its half-open mouth full of two- to three-inch thorns.'

Gladys, one of the famous Ambosch rhinos. When a rhino lies down, it first sits on its haunches and then lowers the front part of its body.

(Malawi) at present, even though they have been reported from there in former times.

In the Congo, black rhino are only found in Katanga, in the northern part of the Kundelungu Mountains, and it is not known how many survive there today. According to Schouteden there is no definite evidence for the occurrence of the species anywhere in the northern parts of the Congo, including Rwanda and Burundi. This seems very strange, in view of the fact that the animals used to be very common in Karagwe, which borders on Rwanda.

Rhinos have always been rare or non-existent in the extreme south and southwest of Tanganyika, and they have now also completely disappeared from the Rukwa area. An occasional individual can be found on the Ugalla River. The species is somewhat better represented along the Rungwa River, in the Kishanda Valley, in the Southern Highlands Province, along the lower Mbarangandu, Luwega and Kilombero Rivers. Its real stronghold is in the north of the country, where rhinos are still fairly numerous in some areas, for instance in Masailand as well as in the Mbulu and Bukoba Districts. Ngurdoto Crater, the Momella Lakes at the foot of Mount Meru, Lake Manyara National Park and Ngorongoro Crater are still good places to see rhino, and one can often find a few near Banagi in the Serengeti National Park.

In course of an air-count over Ngorongoro done by Professor Grzimek and his son Michael in February 1958, nineteen rhino were seen. A year later, on February 18th, 1959, I counted fourteen different individuals in course of a day's drive within the crater. Shortly afterwards, on July 1st, Ngorongoro was very unfortunately and against expert advice excised from the Serengeti National Park and turned into a separate Conservation Unit. This led to five or six rhino being killed by Masai within a few weeks. Some more have been slaughtered since, though this killing has now been checked. Even in recent years, I have never yet visited the crater without seeing at least a few of these animals. According to a report published in a Nairobi newspaper in February 1965, no less than fifty different rhinos were observed in the area in course of nine months. Not all of them are permanent inhabitants

of the crater itself, but up to thirty-seven are said to have been seen there at one time.

In Kenya responsible people began to worry about the dwindling numbers of rhinoceroses as early as 1906, when large-scale poaching was reported from what was then known as the 'Southern Game Reserve'. The Governor of the day, who obviously took the interests of the country's unique wildlife more to heart than some of his successors, insisted that sportsmen be allowed to shoot only one rhino per licence instead of two, as before. Even though A. Radclyffe Dugmore saw and photographed numerous rhinos on his African expedition of 1908, he found himself induced to prophesy: 'The rhinoceros will probably be the first to go . . .' In 1921 and 1922 Dugmore returned to East Africa, and in his book *The Wonderland of Big Game*, published in 1925, he wrote: 'The most notable decrease among the animals is that of the poor old rhino, notwithstanding what anybody may say to the contrary, and some observers may challenge my statement. During my first visit to Kenya I saw as many as thirteen in sight at one time, and groups of four or five were not uncommon. During my last trip, when I covered a large area of country and visited many places where rhino used to abound I saw thirteen altogether. The ease with which the stupid creatures may be shot must account for this, coupled of course with the idea, prevalent with many people, that it is a noteworthy feat to kill the wretched brute. Unless very stringent laws are made for their protection, it is safe to predict their early extermination, except possibly in forest country, where they still live more or less unmolested.'

The slaughter has gone on unabated and, sad to say, has even been aided and abetted by the post-war colonial government. In the fifties a professional hunter was ordered to clear all the rhino out of a certain area, earmarked for agricultural development. He killed over one thousand of these unfortunate animals! If this wholesale massacre was thought necessary, the authorities should at least have considered it as their duty to assure that a maximum of scientific information would be derived from it, as in the case of recent hippo and elephant control operations in the Queen Elizabeth and Murchison Falls National Parks. Nothing at all was done in this respect, and in addition one

wonders if the shooting was really necessary. I have it on the authority of a former high-ranking member of the Kenya Agricultural Department that the area was by no means suitable for settlement. It could have been turned into a rhinoceros reserve which, today, would be of the greatest value to the country from a tourism point of view. But so many of the post-war administrators simply could not see the immense tourist potentialities of East Africa's wild life!

In 1960 the number of black rhinos surviving in Kenya was estimated at 2,500. I give this figure for whatever it is worth, for even now there is nobody who could make a really authoritative statement on the subject. But let it be said that the visitor who wants to see these animals in their natural habitat, cannot do better than to visit Amboseli Reserve or the Tsavo National Park. There are also rhino in the Mount Kenya and Aberdare Mountains National Parks, as well as in the Mara Reserve. Nairobi National Park, the world-famous game sanctuary within view of the modern buildings of Kenya's capital, contains about a dozen of them. Since the beginning of the century rhino have been completely eliminated from most parts of western and south-western Kenya and reduced to practical extinction over large areas of the Northern Frontier Province and in the Rift Valley sector extending from Lake Naivasha to Lake Baringo. On the other hand, small 'islands' containing flourishing rhino populations are even now being discovered from time to time and the less said about their location, the better for the much-persecuted animals!

Even though Kenya and Tanganyika are the African countries with the greatest number of black rhinos, there is no room for complacency. If the rhinos are not given the most effective protection possible, they could be wiped out in a very short time.

As far as Uganda is concerned, a few black rhino lived in the Masaka and Ankole Districts within the memory of early residents. In 1942 C. R. S. Pitman, the first game warden of Uganda, could report plenty of these animals in the northern and eastern regions of the country. In 1953 a number still existed in East Madi and Western Acholi, the Aswa River region and North Karamoja, while some were discovered to have survived in South Karamoja. By 1957 the rhinos of Northern

Acholi had been practically exterminated by poachers coming over from the Sudan, and the stronghold of the species was now quite definitely in the Kidepo Valley of North Karamoja. In its 1958–1960 report, the Game Department authorities resigned themselves to the fact that before long there would be few, if any, black rhinoceroses left in Uganda outside the Kidepo Reserve and the Acholi part of the Murchison Falls National Park. A few, much harried by poachers, were reported to be scattered throughout Northern Acholi and along the banks of the Albert Nile.

Considering the drastic reduction that has taken place in many parts of northern Kenya, one cannot expect many rhinos to be left in Somalia, in former British Somaliland and in Ogaden. They never occurred on the Abyssinian Plateau, but last century explorers, like Blanford and von Heuglin, found them in some of the eastern, northern and western valleys up to altitudes of 5,000 and 8,000 feet. They have now practically disappeared from the country, very few holding out along the eastern and southern borders. In the eastern Sudan, where in 1867 Sir Samuel Baker found plenty of rhino along the Setit River near Gedaref, the animals had become rare by 1912 and could only be found much farther to the south, along the Dinder River. After the Second World War, there were about 200 individuals left on the eastern bank of the White Nile, especially in certain low-lying areas between Juba and Torit. We can assume that most of them have meanwhile become the victims of horn poachers.

For a long time it was thought that black rhinoceroses never existed in the Sudanese districts to the west of the Nile, a strange assumption, considering that in Ubangi-Shari the species is – or was – found close to the western borders of the Sudan. When T. R. H. Owen was asked to have a look at some aggressive rhinos near a place called Turelei in northern Dinkaland, about 150 miles west of the Nile, he expected to find a few unusually grouchy representatives of the otherwise well-behaved white species. The animals turned out to be black rhinos, however, and in 1947 a Danish Zoological expedition collected a specimen. Peter Molloy heard of a second 'pocket' on the Chel River west of Wau, and thinks that the prehensile-lipped rhino was formerly

as widespread on the western bank of the Nile as it was east of the river in Baker's time.

Moving westwards we find the same dismal story everywhere. Incredible numbers must have been butchered during the last fifty years in all the countries lying between the Sudan and Northern Nigeria. In Ubangi-Shari they were reduced to such a dangerously low level that in course of a three months' survey conducted in 1931, E. Gromier, the famous French naturalist, found just one in an area where there had been thousands! He was told that a Goanese merchant had had 600 killed by his native hunters before he was caught, while another trader was known to have looted almost 4,000 lb. of rhino horn in one trip. It is pleasant to record that in Ubangi-Shari there seems to have been at least a slight increase in numbers within recent years.

Rhinos have become scarce in Central and North East Cameroon, very rare in the Lake Chad area and may be extinct in Nigeria, though there are rumours of a few surviving on the Gongola River in the eastern Bornu Province. On the Ivory Coast the last individuals were shot near Bouna in 1905. No European is known to have seen a rhinoceros in the former French territory of Niger, but a veterinary officer making enquiries in the time between the two world wars came across some natives who knew the animal well and remembered its occurrence at Djerma-Ganda, a location situated east of the River Niger, halfway between Niamey and Tillabery.

Black rhinoceroses frequent savannah country, mopane and miombo forests, bushveld and dry thornbush, as well as mountain forests and high altitude moorlands. They often wander across open grasslands and the casual observer may get the impression that they are grazing, but they are in fact searching for small, scrubby shrubs growing among the grass. In the Amboseli Reserve it is a composite, *Pluchea nitens O. Hoffm.*, they feed on, sometimes straying a couple of miles from the nearest bush or forest in doing so. Elsewhere they eat tiny thornbushes, and Fraser Darling considers the black rhinoceros as a key factor in keeping down coarse and prickly vegetation. The rapid spread of the whistling thorn over vast areas in recent times is probably a result of the reduction and partial extermination of this animal!

It has already been pointed out that the black rhino is a browser. Placidly it ambles from one clump of bush to the next, often pushing its head right in among the branches. The extremely mobile upper lip grabs whole bunches of green-leaved twigs, intermingled with juicy creepers, drawing them into the mouth, where the powerful grinders crush the mass at the leisurely speed of about one jaw movement per second. Often it is a stick, thicker than a man's thumb, that the pointed lips grab hold of. It is snapped off as with pruning shears and munched until it disintegrates into fibres. Thorns so hard and pointed that they can be used as gramophone needles, do not affect the animal's enjoyment in the least.

It appears all the stranger that the author of an excellent book on East African animals professed scepticism as to the rhinos' eating thorns. 'How often does the cinema camera, for example, picture one having its dinner off a thorn bush and then move into a close up of the two-inch thorns?' he writes, 'I have examined some of these thorn-bushes immediately after a rhino has left them and found that they only select the choice soft end-pieces.' Well, not only have I often watched the thorny twigs disappear between a rhino's rubbery lips, but I managed to get a close-up photograph showing one with its half open mouth full of two- to three-inch thorns – and that was in an area where there would have been plenty of other bushes available. According to my experience there is hardly a bush or shrub black rhinos will not feed on. They take not only thorns in their stride, but are also very fond of euphorbia trees, despite the disagreeable milky latex these plants contain. I have seen them eat herbs of various kinds, as well as swamp vegetation, especially sedges and marsh grass. When they grope around for small shrubs, they often get hold of a bunch of grass as well. Occasionally they feed on the hard high grasses growing around the base of bushes. It is thus not correct to say that they never graze, but grass is certainly of a very minor importance as a food item. In dry areas they will eat wild melons, aloes, sansevieras, adenias and other succulents, and they have been seen to dig out roots. This they do with their forefeet, never using the horns for the purpose. The nasal processes seem, however, to come into play for digging out salt. Quite large

caves, excavated by rhinos and showing the indentations of their horns, have been reported from Marsabit and from the Aberdare Mountains.

Like elephants, rhinos spend a considerable part of the day feeding. During the hot hours they usually enjoy a siesta, though on occasion one can be seen quietly browsing even at noon. For their rest they search out some dense patch of bush, or a belt of high grass. As often as not they settle down under a solitary tree or even right out in the sun. Sometimes between 5 and 6 pm they begin feeding again, slowly moving towards the water.

Some authors have made very definite statements about the hours of the day – or night – when black rhino are supposed to drink, but this quite evidently depends to a great deal on the area and season. In the Amboseli Reserve there is a tendency to go to the water in the late afternoon, but even these rhinos refuse to stick to regular opening hours. The same applies to the parts of the Tsavo National Park where I have watched rhino. I have seen them at the water in the middle of the afternoon, at sunset and at night. In dry, semi-arid regions, like Kenya's Northern Frontier Province or the Kaokoveld of South West Africa, they seem to have a definite preference for visiting their drinking places after dark.

Along the Uaso Nyiro, rhino are said to travel eight to ten miles to the water and back into the thornbush, moving at a good pace and keeping a fairly direct course. In comparatively well-watered places, like Amboseli and the Mara Reserve, many of them walk hardly more than two or three miles in twenty-four hours. I am certain that Pixie often does not move more than a few hundred yards from his bed in the course of one day. The Amboseli rhinos have, so to speak, everything laid on – plenty of bush, interspersed with swamps and open flats. Why should they indulge in unnecessary exercise? In the northernmost part of South West Africa, on the other hand, Steinhardt found them wandering around far and wide within an extensive radius.

Cherry Kearton, who took many of his best early cinema films at various drinking places in the dry regions of northern Kenya, found that the rhinos visiting these isolated pools at night became positively frisky as soon as they reached the water, chasing each other round and

round, puffing and squealing all through the dark hours. Blainey Percival, a former Kenya game warden, once saw over thirty of these animals come to a water hole in the bed of the Olgerei River, and he vividly describes the 'tempest of grunting and squealing' that kept him awake. 'In districts where water is scarce and rhino are many', he writes, 'the animals traverse the same route night after night to the drinking place and wear a path often a foot deep; these trails about twenty inches wide, are beautifully smooth. The beast needs a path little more than twice the width of his foot; by reason of the breadth of his body and the shortness of his legs the fore and hind foot on either side make a track of their own. In sand a tiny ridge is sometimes found between the tracks of right and left feet. . . His paths through bush do not lend themselves with any facility to man's uses; his height being from four feet six inches to five feet, he clears a tunnel suitable for his own stature and no more.' Percival points out that in times of drought rhino are quite adept at digging for water, using their forefeet and throwing out the sand between their hind legs, exactly like a dog. In this way holes eighteen inches to two feet deep are excavated in dry river beds, at the bottom of which water soon begins to collect. While rhinos drink every day – and often even several times a day, when water is close at hand - they probably drink less frequently, perhaps only on alternate days, in arid regions, getting a certain amount of moisture from the succulents they eat.

According to Percival the rhinos of northern Kenya do not as a rule choose a tree or a bush as a resting place, but climb the rocky kopjes dotted all over the country, frequently settling down to sleep in the open and on the highest spot. Such a place would, of course, afford a certain amount of protection from the meat-hungry Samburu tribesmen, but Percival may be right in assuming that this preference is first and foremost dictated by a desire for coolness and air. Rhinos have no sweat glands, and the body temperature can thus not be reduced by the evaporation of a fluid produced by the skin itself. The animals depend on heat regulation by contact with an outside coolant. In especially hot regions, they might well like to expose themselves to the slightest breeze they can find.

Wallowing is, of course, the most important and most efficient way of cooling down, and when rhinos come to drink they almost always take the opportunity of rolling in the mud for a while. It has been said that, in having a wallow, the animals will never turn right over, but I remember one doing just that – and several times in succession – at Aruba Dam in the Tsavo National Park. The depth and consistency of the mud may have something to do with this. After emerging from the wallow, a rhino usually takes a sand bath as well and thus acquires, as has already been pointed out, the colour of the ground on which it lives.

A feature of any region inhabited by fair numbers of rhino is their large dung-heaps. The impression has sometimes been created that each rhino had a particular spot of its own which it visits at frequent intervals to deposit its droppings. In actual fact, these places are used by any rhino that may be walking past, and they are therefore numerous along well-trodden trails and near drinking places. In Zululand, where black and white rhinos occur within the same area, dung-heaps are sometimes used by both species.

One can often see a rhino drop its dung far away from any of these places. Another individual accidentally coming that way later on, will usually stop and deposit its own droppings on the same spot. The dung of the black rhinoceros has the consistency typical for an animal feeding a great deal on twigs and branches and looks like small elephant droppings. While defecating, the rhino puts up its tail and afterwards it scrapes the dung-heap, moving one hind-leg at a time, not throwing it like a dog, but pushing it back and drawing it forward again. There are generally three or four scraping movements of each leg.

It has often been stated that rhinos also use the front horn to scatter their dung. I cannot confirm this, but I have seen them rub their noses on the ground after defecating, belabour the surrounding bushes with their horns and plough up the grass, leaving well visible furrows around the dung-heap, but never touching the droppings themselves. In every instance the rhino doing this has been a bull following a cow, and I think that it is an expression of sexual excitement. Under those circumstances bulls will also scrape before as well as after dropping their

dung, and do so much more vigorously than is otherwise their habit, moving their legs in a real flurry of movement.

My long-standing suspicion that scraping might at times become a part of sexual behaviour was confirmed when early one morning I saw a bull and a cow standing nose to nose, puffing furiously, swinging their heads from side to side and scraping violently with their hind legs, but without dropping any dung. This interesting demonstration went on for several minutes. One animal then turned away and ambled off, the other remained behind, looking very truculent. On another occasion I watched a bull and cow butting each other with noses and horns, making scraping movements at the same time.

I cannot remember ever having seen a rhino urinate at the same time as it dropped its dung, as elephants very frequently do. The male ejects its urine in the form of jets of spray, almost like puffs of aerosol, directed backwards between the hind legs. He will often douse a bush he happens to be passing, but he also ejects these white puffs while just ambling along. I once thought that intermittent spraying might denote nervousness, but I have since seen bulls doing this when there was absolutely no reason for them to be nervous. Thus I once spent a whole morning following Pixie around while he was quietly feeding on an open plain, and he kept on spraying every few minutes, each time lifting his stumpy tail. Pixie has had cars drawing up to him all his life, and I have often been much closer than on this occasion, without him ejecting even a single puff. Could it be due to sexual excitement, I wondered. But a few days later he followed a cow for a couple of hours and all that time he sprayed only two or three times. Longhorn, on the other hand, while trotting after two cows, sprayed several bushes, giving each of them more than one puff. In between he defecated, scraping most energetically and tossing up a whole heap of dead branches immediately afterwards.

In an animal whose world consists mainly of smells, it is of course hardly to be wondered that a number of scent markings and scent tracks should be left, be it to demarcate the place it habitually frequents, or to get in touch with other individuals of the same species. As far as rhino bulls are concerned, the spraying over considerable areas is

probably first and foremost a means of communication, getting it across to any cow coming that way that here is a gentleman who would not be averse to having a little bit of female company. I have never seen this intermittent spraying in females. The cow's urine is also ejected with considerable force, but in form of a liquid jet, not as an aerosol puff.

As a whole I would not call black rhinos territorial animals in the proper sense of the word. Under suitable conditions they certainly are very sedentary. I do not think that during the more than ten years I have known her, Gertie ever went outside an area of about three to four square miles, while Pixie has stuck to a stretch of country roughly two square miles in extent for the last few years. In Ngorongoro Crater and on the Serengeti Plains, there are rhino which I have found in the same spots year after year. Most of the rhinos living in Nairobi National Park rarely leave the forested part of the reserve which extends over something like five square miles. Where rhinos are forced to move over considerable distances, their habits are nevertheless very regular. As far as possible, they always come to the same drinking place, use the same paths, lay up for the daily siesta in the same area. But this does not necessarily mean that they show true territorial behaviour, like male lions which drive other males out of their hunting – or rather mating – grounds; like bull wildebeeste or like buck Uganda kobs, each one standing in its chosen spot as if tethered out to graze, waiting for the females to come along. When rhino bulls fight, they apparently fight over a cow and not over a piece of mating territory, and when they are not interested in an immediate escapade, they do not have any urge to defend a certain area which might serve as a mating ground on a future date. Most of the fights I have seen were between males and females and have a direct sexual significance.

In places where rhinos are numerous and water is plentiful, the feeding grounds of various individuals overlap. Spraying by the bulls probably provides signposts for nearby females. Several rhinos can also keep up a loose and more or less temporary association. The friskiness dry-country rhinos display at the water may perhaps be due to those pools being something like a mating ground, not in the sense that it has

to be defended by one bull against all newcomers, but rather as the one certain meeting place for animals living scattered far and wide over a vast area of thorn country.

The only non-sexual disagreements I have observed concerned cows with calves. In September 1954, I watched Gladys attack Gertie and drive her away, a thing I never saw again in all the many visits I paid to the famous cows. On another occasion I watched two rhinos drinking and wallowing at one of the Momella Lakes in the late afternoon. Suddenly, a cow with a half-grown calf came out of the forest; the rhinos already at the water walked towards them, but the newly arrived cow snorted angrily and chased them back. She remained aggressive even when her calf approached the two as if to make friends. Cows with calves have a definitely nervous disposition which may quite possibly show itself in their attitude towards other individuals of their kind.

As a rule rhinos take very little notice of the game animals which are their close neighbours. You can watch them feeding right among the large herds of wildebeeste, zebras and gazelles. There were two black rhino who, over a long period, took their daily rest in a forest glade surrounded by buffaloes. But at a dam in the Tsavo National Park I have seen a rhino attack and drive off several buffaloes before drinking and having a prolonged wallow. Next evening this same rhino, which came to the water every day just before sunset, turned on some waterbuck it met on the way and ran after them for quite a distance.

Such observations make me somewhat sceptical of attempts to draw up hard and fast rules with regard to the behaviour of higher mammals, while on the other hand I am always prepared to listen carefully to any reliable field naturalist who may be recounting an incident totally at variance with my own experience. In studying the habits of animals we surely must make allowance for individuality and momentary quirks of behaviour.

Even the best books and articles dealing with the black rhinoceros have little to say on the subject of the animal's mating behaviour. One reads quite a lot about furious battles between rival bulls, and I have no doubt that such duels do occur. But one day it struck me that most

of the fighting I had personally witnessed had been between individuals of opposite sex. Thus in the Lake Manyara National Park a cow with a calf went for a bull who tried to make advances, and fought him off with greatest vigour. Most of the engagement took place in thick bush, but there was a lot of snorting and also a deep, snarling sound I had never heard before. On several occasions I had seen a bull and a cow pushing each other around, sometimes, as has already been described, throwing up clouds of dust with their hind legs. All this fitted in very well with what A. T. A. Ritchie had to say in an excellent paper based on thirty years' experience with rhino: 'Mating is almost always preceded and usually succeeded by violent attacks on the bull by the cow.'

I finally decided to spend some time doing an intense study of rhino in order to learn a little more about their mating habits. For my investigations I naturally chose Amboseli, where the animals were so used to cars that there was no danger of their being disturbed by the presence of an observer. In addition, the population was already well known to me, and I could count on being able to distinguish a number of individuals easily.

Every time Rosanne and I drove from Ol Tukai towards Observation Hill we passed close to where Pixie had his bed on the edge of the Simek River, and we usually made a short detour to see what he was up to. One morning Pixie had visitors, a cow with fairly thick horns, and a young bull. The latter might have been a suitor, but it seemed more likely that he was her almost full grown son. The two rhino had possibly come to the river to drink, but I also remembered the fact that Pixie had lately been spraying very assiduously and over quite an extensive stretch of country. Could the cow have followed a scent track? Whatever the reason for the presence of the guests might have been, there was no doubt that Pixie appeared very interested in the female. He had his little tail up in the air and kept trying to approach the lady, only to have his proposals rudely rejected, the snorting cow driving him back in no uncertain manner. After a few short skirmishes she turned away and walked along the reedy edge of the river, together with the young bull. Pixie hastily trotted after them, opening his mouth

and curling up his pointed lip in what was probably a sexual yawn. The cow stopped abruptly, and the animals stood about for a long time, surrounded by a whole flock of cattle egrets.

Suddenly the cow and the young bull got a move on, leaving the river and heading across the open plain towards a small forest about two miles distant. Pixie followed immediately, and the three animals walked in single file. Sometimes the cow was in the lead, sometimes the young bull, Pixie always bringing up the rear, his head held high, the stumpy tail curled over his rump. Whenever he got too near, the cow and her companion swung round and faced him. Pixie then stopped and stood very stiffly, holding the head somewhat to one side or even turning his body slightly away. I do not know if this was supposed to give him a disinterested air or a better chance to run away. Maybe in this way he got a clearer view of what was going on, the eyes of a rhino being in a very lateral position. Frequently either the cow or the bull went for him, and he galloped away for fifty yards or so. But, as soon as the other two continued on their way, he was close on their heels again.

This went on for more than a mile, the spectacle bordering on the ludicrous. Pixie's intentions were so obvious that one almost expected him to offer a posy to the lady of his choice. Following an especially violent attack from the cow, in course of which she uttered a half mooing, half bleating sound, he wandered off quite a long way, so that we thought he had had enough. The cow and the young bull then changed their course towards an extensive patch of bush. This meant that they had to pass near to Pixie, who immediately took up his wooing again. We watched his futile efforts for over two hours, and only when the rhino reached the edge of the bush, did he suddenly lose interest. He turned back the way he had come, and in the afternoon we found him near his bed.

We had thus witnessed the bull's first tentative approaches – but what happened if she kept fighting him off? How did he finally overcome her unco-operative attitude?

On the other side of the Simek River we got to know a bull with a badly torn ear. He kept company with a cow figuring in my notes as 'No. 18'. We kept an eye on the couple, and one evening 'Split ear' showed considerable excitement, trotting around, snorting and opening his mouth in sexual yawns. This looked promising and we settled down in order to watch what was going to happen. We were not mistaken in our expectations for, after some more trotting around, 'Split ear' attacked the cow. She spun round very smartly, and for a while the two stood nose to nose in a big cloud of dust. The bull then backed away, rubbed his nose on the ground, scraped furiously, defecated and scraped again.

After a time he began circling the cow, snorting continuously and twisting his tail over his rump. During most of this display the female stood as motionless as a statue. When she once turned towards 'Split ear' in an aggressive manner, he trampled with all four feet on the spot he stood on, looking for all the world as if he were dancing. A few moments later he launched another attack. But the cow drove him back, opening her mouth wide and uttering the same snarling sound I had once heard in the Lake Manyara National Park, a sound that might be rendered as *chrachrachrachrachra*, the 'ch' to be pronounced as in 'Loch'. 'Split ear' again rubbed his nose in the grass and shredded the surrounding bushes with his horn. This game went on for some time, accompanied by a lot of snorting and snarling.

Suddenly 'Split ear' lost patience and hurled himself against the cow with terrifying ferocity. The Game Scout who sat in the back of the Land-Rover, had the shock of his life. Never had he seen anything like this before, and he thought that the female rhino was going to be killed on the spot. But she gave as good as she received, and we became witnesses of a real battle of the giants, the contestants battering, prodding and pushing each other mercilessly, making sharp turns in order to lunge viciously at unprotected flanks, with dust billowing like smoke and half hiding the huge bodies. Backward and forward they went, and 'Split ear' several times got his head right underneath the cow, lifting her up high, so that only her hind legs remained on the ground.

It was an utterly fantastic spectacle – a breathtaking scene of life in primeval times, when gigantic beasts ruled the world and man was nothing but a chattering ape!

After four or five minutes the cow broke away and tore through the

bushes at a mad gallop, the bull following in hot pursuit. He caught up with her after a chase of about a third of a mile, and the fight started all over again. The cow was, however, weakening, and 'Split ear' pushed her backwards over a considerable distance. He finally turned away, as if satisfied with his victory, but now it was the cow who immediately went for him and got in a few telling blows. There was more pushing and prodding, and the two huge animals showed up coal black against clouds of dust lit a startling white by the rays of the setting sun.

At last the cow seemed to have had enough. She stood motionless, while 'Split ear' walked around, rubbing his nose on the ground, ploughing up the grass and tossing whole loads of branches into the air. He sprayed a bush, scraped several times and worked himself into such a state that he finally advanced once more upon the cow. This time she did not snarl her defiance, but retreated before him, walking backwards. 'Split ear' quietened down almost at once, and when we left the battlefield, with dusk descending on the plains, he was ambling about rather aimlessly.

So bulls and cows did have sexual fights of great violence – even though the cow was not necessarily the aggressor, as had been believed! I could not see any blood on the female, but I certainly realised why rhinos were always covered with scars and open sores!

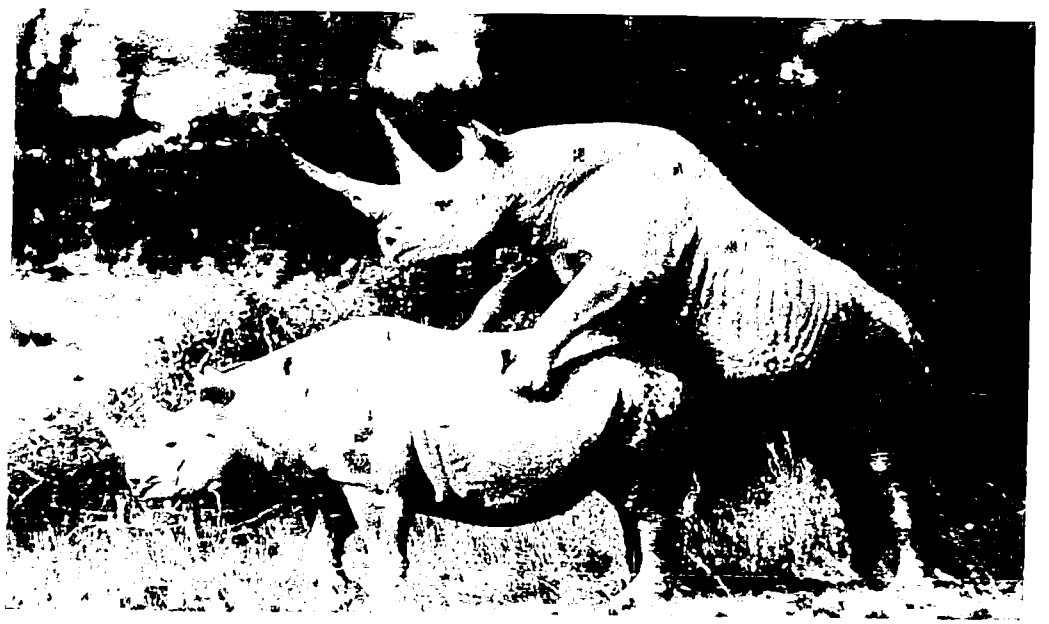
Longhorn and his two cows, which I had put down as 'No. 6' and 'No. 7', had their stamping ground halfway between 'Split ear's' area and Observation Hill, and for a week we could find them there whenever we wanted. The cows had identically shaped horns and were probably related, though we could not be sure if it was a case of elder and younger sister or mother and daughter. As Longhorn from time to time showed unmistakable signs of sexual excitement, we spent a lot of time watching these three rhino. During the late afternoon of September 7th our patience was finally rewarded.

The day before we had seen 'No. 6' induce Longhorn to get up by rubbing the underside of her head against his spine. Now the bull not only did the same to her, but he also nudged 'No. 6' with one foreleg until she decided to rise. Longhorn then prodded her with his specta-

Black rhinos: a bull and a cow having a tussle.

Fighting black rhinoceroses: Amboseli reserve.

'Longhorn' courting, pushing his head up on the cow's back.



Black rhinos mating: 'Longhorn stood towering over the female, his behorned head high in the air'.

cular nasal appendage, afterwards pushing his head up against her back. The female whirled round with great agility, and dust swirled around the legs of the two animals as they began to push each other in the approved rhino fashion. The fight was, however, only of short duration, and, not meeting any very decided opposition, Longhorn proceeded to mount the cow. She turned round, the bull following her movements on his hind legs, his fore feet planted firmly on her back. This lasted for three or four minutes, and there certainly was no actual mating. The female then began to trot, the bull slid off clumsily and galloped after her. She got away from him, and he stopped to spray a bush. The younger cow, 'No. 7', came up to him and lightly prodded his flank, but he did not react to what looked uncannily like an attempt to vamp him!

All three then settled down, but Longhorn was restless and could not stay put. He soon got up again, and after a short while he nudged 'No. 6' with his foreleg, exactly as he had done before. The moment the cow was on her feet, he slid his head on to her back, rubbing and pushing until she turned and let him mount once more. She kept very quiet for about four minutes, then she moved and Longhorn came off. During the next half hour or so, Longhorn sprayed several times, defecated, scraping with great vehemence, and charged a car that had driven up rather abruptly. Having seen off, what to his dim eyesight may have looked like a rival, he went back to 'No. 6' and pushed his head up against her back prior to mounting her for a third time. He stood very erect, towering over the female, his behorned head high in the air, and the two enormous creatures thus presented a perhaps even more weirdly prehistoric sight than the fighting giants had done. They may have mated on that occasion – I could not be sure, as the bull had his back turned to me – but if they did, the procedure took only about five minutes. In the Murchison Falls National Park black rhino were once seen to mate for a duration of thirty-five minutes.

The following day 'No. 7' had left the group, and we found Longhorn lying beside 'No. 6'. He once got up and put his horn on her back, but when she failed to react, he did not insist and settled down again. He then left her, and next time we saw him he was all alone in thick

bush not far from the Kiturua Hills. On September 13th, however, we found him and the two cows together with two bulls which figured in my notebook as 'No. 19' and 'No. 21'. It was 'No. 19' who now courted 'No. 6', trotting after the cow, circling around her and once even mounting her, having first pushed his head up on her rump just as Longhorn had done. Longhorn himself had quite obviously lost all interest. He walked around, browsing placidly and showed not the slightest resentment with regards to the presence of the two other bulls. In course of the day, he left the group and disappeared in the bush.

When we came across that group of rhinos again a couple of days later, 'No. 19' had left as well. But now a cow which I knew as 'No. 32' had joined it in his place. The animals were in fairly thick bush, so it was extremely difficult to find out what was actually happening. We only got glimpses of backs and horns, but there certainly was plenty of movement, I once saw bull 'No. 21' with his head on the rump of cow 'No. 6' and there was no lack of snorting and snarling.

Thus, within eleven days, cow 'No. 6' had been courted by three different bulls. We had seen all three with their heads pushed up against her back or rump, and in the case of two of them, this had definitely been a gesture preliminary to mounting. There had been some fairly mild fighting between the cow and the bulls, but not once had we seen the males come to blows over her. I am convinced that there are fights between rival black rhino bulls, just as they are known to occur among white rhino. In the case of the Amboseli bulls living in fairly close contact all the time, they probably know each other so well that each one is perfectly aware to which of the others he has to give way. The evidence available seems to me to go a long way to show that mating can take place at any time of the year.

It is naturally very difficult to get a complete set of data on the mating behaviour and reproductive habits through observations in the wilds alone. We have to rely to a certain degree on studies done in zoological gardens to fill the many gaps. The Brookfield Zoo of Chicago was the first to succeed with a black rhino birth in captivity. It was a tiny little thing, weighing 55 lb. and having not the slightest trace of a horn on its nose. Another black rhino calf, born in Rio de Janeiro in 1954, weighed

only 44 lb. The authorities of the Rio Zoo made the interesting observation that up to three days before the birth, the female was being mounted at regular intervals. It must thus be assumed that the sexual cycle – in the case of the black rhino probably a cycle of three and a half weeks – goes on for the whole duration of the pregnancy. I must repeat that all this is based on observations in captivity. We do not yet know to what degree all this applies to rhino living under natural conditions. Since 1954, calves have also been born in Frankfurt, Bristol and Sidney.

The gestation period is given as 485 to 548 days in Maurice Burton's very useful *Systematic Dictionary of Mammals*, as 540 days in the International Zoo Yearbook for 1959. Meinertzhagen cut a young rhino almost ready for birth out of a cow he had shot and noticed that it had hair around the eyes, on the face, as well as on the back and rump. I do not think that there has ever been a record of twins.

The Frankfurt zoo's calf made some attempt to get to its feet only six minutes after birth and succeeded a few minutes later, at 18.45. Its legs were still rather weak, however, and it fell down after two minutes. For the next quarter of an hour the little animal struggled gallantly, and at 19.00 it not only managed to keep on its feet for quite some time, but it also began to search for its mother's teats. At 19.10 it walked four or five yards, still rather wobbly, but without falling. Twenty minutes later it covered this same distance without any difficulty and remained on its feet for nearly half an hour, nuzzling the folds on its mother's neck, her head, ears, tail and flanks in its search for the udder. From time to time it took a short rest, but it was up from 19.50 to 20.50. At 21.30 it uttered the first peeping call, and five minutes later, it found the teats, immediately drinking its first two gulps of milk. The calf kept moving about for most of the night, occasionally lying down for ten or twenty minutes. Once, towards dawn, it lay down for just over half an hour. We can safely assume that this account, as given by R. Faust, also applies to the first few hours in the life of a baby rhino born in its native haunts.

As long as the calf is very small, mother keeps it hidden in dense bush. Later, when she begins to wander about with her offspring, the youngster sticks to her for dear life, and the mother watches over it with

utmost care. The bull at the Rio Zoo was fought off with great fury when he tried to attack and kill the small calf mentioned above. I have no doubt that in the wild a cow rhino will defend her child with equal vigour against lions and hunting dogs.

It has been known for a long time that a young rhino stays with its mother for several years, in fact, until the new calf is about to be born. But the Amboseli rhino have now provided us with some definite data. Pixie, for instance, remained with Gertie for two and three quarter years, Gertie's next calf for three years, and the one born in 1959 has now been with her for over five years. The intervals between births can thus vary considerably.

All the cows I have watched suckling their young did so standing, but Percival mentions one lying down like a pig to let her offspring get at her teats. The mammae, two in number, are situated inguinally. The calf certainly suckles till it is two years old, possibly even somewhat longer. At first it grows very fast and then slows down but, according to observations made in the London Zoo, it goes on growing until after it has reached the age of nine years. Ritchie is probably right in assuming maturity to be reached at about the age of seven rather than at five, as is usually stated.

A cow with a small calf is never seen together with a bull, but a male may join her once the youngster is fairly big. Occasionally she allows the previous calf to come back some time after the birth of her current offspring. In certain areas, for instance in the Amboseli Reserve, several former calves may temporarily rejoin their mother, but this must be regarded as rather unusual in the case of the black rhino. The groupings most commonly seen are: a cow and a bull; a cow and a calf; a cow with two calves several years apart in age; a solitary calf that has left its mother; a solitary bull. Even though the calf usually follows behind the cow, it will at times precede her and may very occasionally be directed in its course by its mother's front horn. It utters mewing sounds to attract its dam's attention, especially when it has lost contact with her.

As a whole, rhino are not quite as silent as most people think. They puff and snort when alarmed, and I have heard an eighteen-month-old

calf scream with terror as it was being lassoed by a game catcher. Adults snarl harshly during their sexual fights and they squeal when they chase each other around the water holes. Rhinos approaching the water have been heard to produce a sound which has been described as 'like a man trying to get his breath after receiving a violent blow in the solar plexus'. It may be identical with the half mooing, half bleating noise uttered by the cow which tried to make Pixie see that she did not want his attentions.

How long does a black rhino live? The Masai at Amboseli are positive about having known Gertie and Gladys before the Second World War. The two cows were very big, fully mature animals when I first saw them, possibly between twenty and thirty years old, and I think that a life-span of fifty or even sixty years might not be an exaggerated estimate. A black rhino would thus reach roughly the same age as an elephant.

The commonest cause of death is doubtlessly an encounter with that most dangerous and bloodthirsty of predators, man. Compared with the threat from rifle, spear and poisoned arrow, other dangers pale into insignificance. Occasionally a rhino gets stuck in a wallow and fails to get out. Such an incident was filmed by the Milottes, when they were working on Walt Disney's *African Lion*. In that case, man for once appeared as a friend in the shape of the game warden who dragged the animal out of its muddy trap and thus saved its life. But a rhino which got bogged down in a similar fashion in Nairobi National Park was unfortunately so badly mauled by hyenas that it had to be destroyed.

Relations between the black rhino and the biggest carnivorous animal found in its habitat – the lion – are complex and, as is the case with so many other phases of animal behaviour, it appears well nigh impossible to find a common explanation for all the observations on record. I have seen rhino seriously alarmed after getting the wind of lions. But I also remember a bull taking no notice at all of two lionesses walking past him and settling down not twenty yards away. There are accounts of lions playing around a rhino, which did not pay the slightest attention to them; of rhino drinking placidly in close proximity to a pride of lions; and of lions hastily giving way to a rhino bearing

down on them like an armoured car. In November 1957, two male lions attacked an almost full-grown rhino near Ol Tukai, wounding it so badly that the game warden had to shoot it. Only a few months ago I heard of a rhino being killed by lions in the Tsavo National Park. Colonel Stockley, the well-known animal photographer, watched two lions spending half an hour in trying to separate a three-months-old calf from its dam, all their efforts being foiled by the way the two rhinos stuck together.

According to Pliny, one of the great 'antipathies of nature' exists between the rhinoceros and its sworn enemy, the elephant. He tells us that the rhinoceros sharpens its horn against a hard stone and charges the elephant full tilt, aiming straight at the belly 'which he knows to be more tender than the rest'. This tale has been repeated over and over again, and the Abbé Ladvocat, an eighteenth-century librarian of the Sorbonne, found himself speculating on the reason for this traditional enmity. 'They find themselves at war,' he wrote, 'because both animals are of gluttonous habits and grudge each other the grazing. The elephant, crafty and subtle as he is, sometimes manages to elude the rhinoceros' onslaught, tires that animal out with his trunk and hacks it to pieces with his teeth.'

More modern writers tended to treat this story with considerable suspicion, laughing it off as one of the numerous fables Pliny so gullibly incorporated in his *Natural History* but there may after all be a certain element of truth in it. 'Cow elephants and rhino – of either sex – are simply incompatible,' remarks Syd Downey, a very observant Kenya white hunter, 'any hunter with experience could cite evidence to illustrate that cow elephants do not approve of these lesser beasts. But with bull elephants there is often mutual tolerance . . .'

I have seen rhino get out of the way of elephant herds in a considerable hurry and even act nervously when a solitary tusker suddenly appeared on the scene, and I was once shown the carcass of a rhinoceros that had been killed by elephants. But I also possess photographs showing a group of rhino taking absolutely no notice of a bull elephant passing close to them. Philip Keller, in his wonderful book *Africa's Wild Glory*, gives a hilarious account of four young elephants trying to

chase an old and crusty male rhino out of his favourite dust bath, and being seen off in their turn by the irate bull. Downey, too, says: 'It is certainly true that rhino will sometimes act belligerently, and get away with it, when bull elephants offer competition for water or feed or shade.'

Sitting up over a waterhole one moonlit night I watched a meeting between a solitary rhino and three big bull elephants. The tuskers trumpeted angrily, and the rhino gave vent to a series of puffs that would not have disgraced a locomotive. It held its ground for some time, but, with the three gigantic shapes inexorably pressing forward, it finally beat a very unwilling retreat.

Many years ago, on one of my first visits to Mzima Springs in Tsavo National Park, the game scout said: 'Bwana, do you want to see a *faru* that has been killed by a *kiboko*?' A rhino killed by a hippo! I certainly did want to see this and followed the man around the limpid pool, from which came the grunts of a dozen or twenty hippopotami. Soon my nose began to perceive a strong smell of putrefaction, which became more and more intense as we approached the water. '*Iko huko* – there it is', said the African, and in fact, among the reeds lay the carcass of an almost full-grown rhino, its head half submerged. In coming down to drink the animal had obviously been unlucky enough to collide with a hippo emerging from the pool. The battle between the two old-world beasts under the brilliant African moon must have been quite a spectacle! The hippo had caught hold of the rhino's left front leg, dragging it down and finishing it off with its enormous tusks. I was reminded of that famous series of photographs published in Selous' excellent *African Nature Notes*, showing a full-grown cow rhino being dragged under water by a crocodile.

I do not suppose that anybody has seen a rhino fall victim to a crocodile since these pictures were taken on the Tana River of Kenya, but Colonel Meinertzhagen gives an account of an even more unusual incident, a hen ostrich attacking a rhino that had happened to come too close to her eggs. The rhino, struck by the hen's powerful feet, gave a snort and went off at a trot. On a later occasion, a rhino which Meinertzhagen wounded seemed to consider a hen ostrich leading a covey of

chicks as being responsible for the injury and tried to toss her. The hen 'waltzed' around the attacker, using her legs with vigour until the bullet took effect, and the rhino collapsed.

One day, while taking photographs of a peacefully browsing rhino near Kitani Camp in Tsavo National Park, I suddenly noticed a small herd of zebra approaching at a gallop. Two of them started fighting each other, turning round and round, but the others went straight for the rhino, swarming around it like mischievous children out to annoy a somewhat clumsy adult. Old 'faru' got very flustered, charged through the exuberant gang, and trotted away with, I am tempted to say, an air of injured dignity. The zebras rallied, followed at full speed, and the rhino had to make a second charge to get rid of them. The whole thing was one of the most ludicrous and inexplicable scenes of animal life I have witnessed.

You hardly ever see a rhinoceros without its complement of oxpeckers, ash brown birds related to the starlings, with red beaks and yellow rings around the eyes. They certainly free the rhino from a lot of the ticks adhering to its skin, but they also cause the big animal plenty of bother by sticking their strong beaks into its nostrils and ears, and by pecking at any open wound or sore they can find. The rhino twitches its skin and wags its ear trumpets to chase them away; it even kicks out with a hind foot at a bird clinging to its belly, but the oxpeckers simply cannot be got rid of. I once saw a a rhino rise its head in sheer desperation and shake it violently, mouth wide open in anger – the birds fluttered for a few seconds, and then went back to work again, busily climbing around the animal's eyes, ears and nose. In the game reserves the oxpeckers have, of course, become as used to cars as the rhino themselves. But in open hunting areas, they often render their mammalian hosts a real service by flying up and uttering harsh, screeching calls whenever they catch sight of a human being, thus more or less lending their eyes to the myopic giant. I have even seen Gertie and her calf come to their feet very promptly when a quarrel, accompanied by a lot of screeching, broke out among their oxpeckers.

Where there are swamps or large water-courses, rhino are often accompanied by cattle egrets (*Bulbulcus ibis*). One of these pretty white

birds stuck to Pixie for more than a mile, sometimes walking close beside him, sometimes riding on his back. Once or twice it snapped at something – possibly a fly or a grasshopper – on Pixie's legs, but what it was quite obviously after, were the insects disturbed by the feeding rhino's muzzle and by the heavy tread of the large feet. It has often been stated that the cattle egrets, which also accompany domestic stock, buffaloes, elephants, wildebeeste and zebra, feed on ticks.* Stomach examinations done by Chapin, Hoogstraal, Kirkpatrick and other research workers, have provided absolutely no evidence for this. The name tickbird, sometimes given to the cattle egret, is therefore completely misleading.

In the Hluhluwe Reserve of Zululand I have seen a pied crow (*Corvus albus*) perched on a black rhino's back.

Wounds and sores naturally attract numerous flies which sometimes congregate in such masses that a big black patch appears on the animal's skin. A lot of these insects may probably be considered as just a nuisance, but rhino are also parasitised by bot-flies, the larvae of which penetrate the intestinal tract and attach themselves to the walls of the stomach.

The fact that almost no rhino is without some open sores has been remarked upon by many of the early naturalists and hunters. Schil-

* The ticks most commonly found on the black rhinoceros are *Dermacentor rhinocerinus*, *Amblyomma rhinocerotis* (synonimous with *A. aureus* and *A. petersi*) and *Amblyomma personatum*. Miss J. B. Walker, who knows more about East African ticks than anybody else, has kindly furnished me with a list of further ticks which have been collected on black rhinos:—*Amblyomma hebraeum*, *A. lepidum*, *A. sparsum*, *A. tholloni*, *A. variegatum*, *A. gemma*, *Hyalomma albiparmatum*, *H. rufipipes*, *H. impeltatum*, *H. truncatum*, *Rhipicephalus appendiculatus*, *R. capensis*, *R. maculatus*, *R. pulchellus*, *R. simus*, *R. ziemanni*, *R. compositus*, *R. humeralis*, *R. hurti*, *R. jeanneli* and *R. neavi*. A few have only been labelled as having come off rhinoceroses, without any indication as to species; they are *Haemaphysalis leachii*, *Rhipicephalus mülensi*, *R. sanguinens*, *R. senegalensis* and *R. supertritus*. Some of these ticks – for instance *Amblyomma sparsum* – parasitise rhino quite frequently, but many can only be considered as accidental parasites. Thus *Amblyomma tholloni*, which has occasionally been found on a rhinoceros, is first and foremost a parasite of the elephant.

Ticks fasten themselves by preference to parts of a rhino's body where the skin is fairly thin. On the only freshly killed specimen I ever had an opportunity to examine, there were a dozen to twenty *Amblyomma rhinocerotis* clustered around the anus.

lings noticed that these sores were usually on the side of the belly. The natives called them dundo and thought them to be caused by the oxpeckers. But Schillings had a strong suspicion that the lesions might contain some morbific agent and collected some pieces of skin with dundos in order to have them examined after his return to Europe. He was, of course, not able to fix the specimens in the very elaborate way necessary for a really thorough pathological study, and this may be the reason why at that time nothing could be discovered in the wounds. But the German naturalist was on the right track, for sixty years later two South African research workers who sectioned cutaneous lesions taken from the black rhino, were able to record the presence of *microfilaria* and adult *filarioids*. Microscopic examination revealed only fragments of these minute worms, and a proper determination was not yet possible. Investigations were continued in East Africa, where J. G. Tremlett recently had an opportunity to examine four rhino in the Tsavo National Park. All had lesions situated on each flank, just behind the point of the elbow, the largest sore measuring 15 to 20 cm. in diameter, the smallest between 5 and 7 cm. Adult worms were recovered from the peripheral areas of the lesions and recognised by M. C. Round as a new *Stephanofilaria*, of which genus five species had previously been described, all of them coming from bovine hosts. The occurrence of a sixth species, *Stephanofilaria dinniki*, in the skin lesions of black rhinoceroses, was therefore of great interest to helminthologists.

The small, hairlike worms are probably transmitted by a biting fly, but the question remains: Are they the primary cause of the lesions which can be found not only on the flanks, but also on the limbs, or must they be regarded as secondary invaders of the wounds rhino receive in fighting each other, and which might thus be kept in an open festering condition? This is an interesting problem waiting to be solved by some enthusiastic parasitologist!

4 The White Rhinoceros

Doves were cooing all round and beautiful white lilies swayed gently in the morning breeze as we moved along silently, carefully. A ragged native tracker, carrying a long spear, was in the lead, followed by Adutia, a game guard, armed with an ancient rifle. I kept on Adutia's heels, holding my Leica ready for instant use, and behind me came Wally, my American companion, with a motion picture camera. Somewhere to the east of us flowed the mighty Nile. The site of Wadelai, Emin Pasha's old station, could not be many miles away. The grass, sparkling with dew, stood high, sometimes reaching up to our hips, and the bush was fairly dense, though opening sufficiently in places to allow us to see up to a distance of a hundred to two hundred yards. We saw the tracks of buffaloes and hartebeeste. When we crossed a sandy river bed the guide drew our attention to the pug marks of a lion. There seemed to be plenty of game about, but we only caught sight of a bushbuck which glanced at us in alarm.

We were looking for white rhino, which at that time – in 1954 – were still fairly common in the southern part of Uganda's West Nile District. We had, in fact, not been on the way for more than half an hour, before we hit on the tracks of two or three as clearly visible in the wet grass as if a couple of steam rollers had been driven that way. Our progress now became extremely slow and circumspect, the guide stopping every few yards to test the direction of the wind. The well-known screeching of oxpeckers finally gave us fair warning that our quarry was somewhere nearby – but had the birds also alerted the rhino?

We advanced another fifty yards or so, hardly daring to breathe, and then the tracker stopped in a crouching position and pointed with his finger. In a dense thicket I could just make out the outlines of a large animal. My binoculars revealed a white rhinoceros, the very first I had ever seen. Studying it through my glasses I suddenly became aware of two others standing a little further back. I held up three fingers, and Wally nodded. With utmost caution we stalked forward, but long before we could get a clearer view, the animals came alive and crashed through the bush in panicky flight, vanishing from sight within a couple of seconds.

We soon found the fresh tracks of a cow and a calf. After about a mile and a half, we discovered these animals hiding in a clump of bush, just as the first three had done. This time I advanced alone, and after a longish stalk I succeeded in getting quite close to the calf. Unfortunately it stood in the deep shade, and I realised that on a photograph it would hardly show up at all. I therefore moved sideways in an effort to get it against a somewhat different background, but before I had reached the spot I was aiming at, there were a couple of violent snorts, the cow, which had been lying down in the very centre of the thicket, got to her feet and next moment the two rhino had gone.

Again I had failed in my efforts to get photographs! But I was not going to be defeated so easily, and, throwing all caution to the wind, I sprinted forward, towards the gap between two big bushes, only to be brought up short when I suddenly saw the calf standing right in front of me, absolutely perfect for a picture. Fighting down my excitement I focused with great care and took my first snapshot of a white rhinoceros. The calf may have heard the click, for it made a few steps forward, which took it out of my limited field of vision.

Where was the cow? I fully expected her to follow the youngster and kept the camera pointed at the spot where I thought she might appear. I had the shock of my life when I suddenly saw the viewfinder filled with a broad mouth and a pair of enormous nostrils – the adult rhino had been standing only a few yards away, separated from me by just one bush around which the big animal now came walking. This nose-to-nose encounter must have alarmed the cow quite as much as it did me,

for she was visibly startled, spun round and galloped away, taking along her calf. I ran forward again, hoping that the animals would stop and turn back as black rhino frequently do, but they went straight on and disappeared amongst tree and bushes.

When Wally and the two Africans joined me, I had at least the satisfaction of having taken a couple of pictures. Whatever was going to happen from now on, I would not come out of this white rhino hunt with completely empty hands.

In those days pictures of white rhino taken in the wild in Uganda at least were fairly rare. But nowadays it is different. White rhino in Uganda and in Natal have made the news time and time again, as the result of numerous successful attempts to capture them and move them to national parks.

In the previous chapter I have described how the black rhino became known to the scientific world when the Dutch founded their first settlement at the Cape of Good Hope. In course of the eighteenth century, with hunters, explorers, adventurers and settlers penetrating further and further towards the north, there were occasional vague rumours of a different species. It was not until 1812 that this animal was properly recognised by that excellent naturalist and most observant traveller, William Burchell. He collected specimens at Kuruman, in what is now the northern part of the Cape Province, and published a full description in 1817.

'In my travels in the interior of South Africa,' he wrote, 'I met with these animals for the first time near the 26° of latitude, inhabiting the immense plains. They frequent the fountain every day, not only for drinks, but also for the purpose of rolling in the mud, which by adhering to a skin entirely free from hairs, serves to protect them from the scorching heat of the climate. The size is nearly double that of the specimen named *Rhinoceros bicornis*. The two animals are recognized by the negroes and Hottentots as two very distinct species, and are distinguished by them by different names. As we killed ten examples, I have had sufficient opportunities of observing the characters which distinguish them. They consist principally in the form of the snout . . . I have named this *Rhinoceros simus* (the flat-nosed rhinoceros). The negroes and Hottentots

inform me that it eats nothing but grass, while the other species feeds on branches of trees and shrubs, a peculiarity which may be inferred from the structure of the mouth. The head, when separated from the first vertebrae, was of such enormous weight, that four men could only raise it from the ground, and eight were required to put it into the carriage. The flesh of the two species is equally good to eat; and they resemble each other in having a double horn and wanting conspicuous hairs on the skin.'

Andrew Smith, who made a very successful zoological expedition to the upper reaches of the Limpopo River in 1835, found the flat-nosed rhinoceros gone from the Kuruman area and had to travel as far north as the present site of Mafeking before a member of his party shot one of these animals. About the same time Cornwallis Harris encountered great numbers of white rhinoceroses after having passed Kurrichane. In course of one day's treking through the Magaliesberg District he saw no fewer than eighty, while further north, in the Limpopo Valley, he once counted twenty-two in a single day.

Oswell, Livingstone and Andersson all reported this species as very numerous in what is now Bechuanaland, while Baldwin shot it near the two Umfolozi Rivers in Zululand. While hunting elephants in Matebeleland and Mashonaland during 1872 and 1873, Selous met with white rhinoceroses practically every day.

The original distribution of the South African white, or square-lipped, rhinoceros coincided quite strikingly with the range of the Bushveld vegetation and extended from Zululand, the Transvaal Lowveld and southern Portuguese East Africa through Southern Rhodesia, Bechuanaland and the northern part of the Cape Province to northern Southwest Africa and South Eastern Angola, where it was found between the rivers Kunene and Chobe. It has never been reported from the grassland plateau of the Orange Free State and Transvaal, nor is there any evidence for its occurrence south of the Orange River, with the doubtful exception of a Bushman painting at Lorraine near Clanwilliam, which the experts state positively to represent this species. The Bushman who painted it, might, of course, have migrated down from the Orange River.

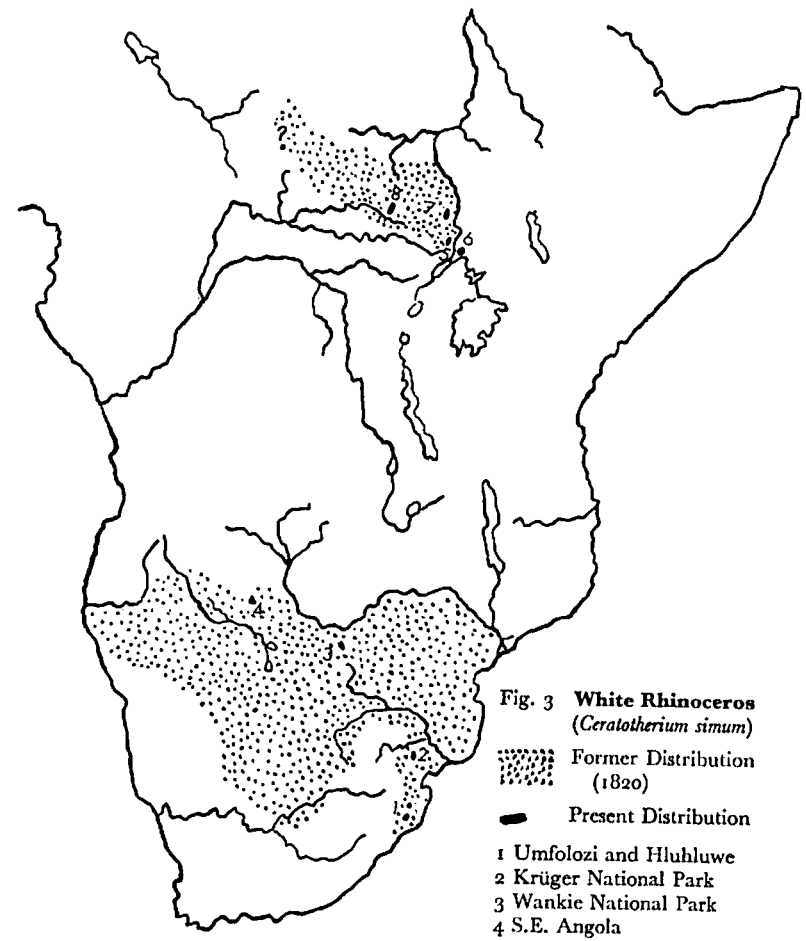


Fig. 3 **White Rhinoceros** (*Ceratotherium simum*)

Former Distribution (1820)

Present Distribution

1 Umfolozi and Hluhluwe
2 Krüger National Park
3 Wankie National Park
4 S.E. Angola
5 West Nile and West Madi
6 Murchison Falls National Park
7 Nimule National Park
8 Garamba National Park
? Unconfirmed Report

The northern boundary of the white rhino's range was formed by the Zambesi. No European has ever seen one in Northern Rhodesia (Zambia), but there is a strong possibility that the animal did exist in south western Barotseland not long before the first explorers visited the country.

The white rhinoceros could be killed even more easily than the black species, and its flesh was very much appreciated both by the Whites and the Blacks. It was therefore rapidly wiped out in the Cape Province and in the Lowveld. By 1880, the species had become extinct or very scarce in Ngamiland, Matebeleland and Mashonaland. Selous saw his last southern white rhino in 1882. One was shot in 1895 and can now be seen in the South African Museum in Cape Town. It seems to have been the last recorded Rhodesian specimen. Around the turn of the century the creature had disappeared from Portuguese East Africa, and after a long search Edouard Foà, the French explorer, came to the conclusion that this interesting and harmless beast had gone for ever. William Cotton Oswell, who had shot many on his exploring expeditions, sadly wrote in his old age: 'Considering the numbers there used to be, I hoped he would have lasted longer.' A sentiment that must have been echoed by sportsmen with regards to very many animals all over the world!

At the time when Foà and Oswell wrote the square-lipped rhino's obituary, there were actually still a few left in Southwest Africa, where Steinhardt recorded their presence at the time of the First World War, stating that they occurred in the northeastern Kaokoveld, to the east of the Omuhonga Mountains.

There have been unconfirmed rumours of white rhino holding out in the Zambesi Valley up to 1933, and according to a reliable observer a few specimens can still be found in southeastern Angola.

As early as 1894 a few survivors were discovered in Zululand, and it is said that in course of that year no fewer than six were killed by hunters. In 1897 the area was declared a game reserve, and six years later Newton ascertained that some square-lipped rhinos were still roaming over the country between the Black and White Umfolozi Rivers. A report published in 1910 put their number at fifteen, and it was thought that protection might have come too late. The animals had, however, found a

guardian angel in F. Vaughan Kirby, a sportsman-naturalist of the best type who, as so often happens, had turned conservationist. He spent a lot of time on trek within the reserve, which he knew extremely well, and nobody saw any reason for doubting him when, in 1922, he announced that there were still only about twenty rhino to be found between the two Umfolozi Rivers.

But Vaughan Kirby knew only too well that popular feeling was antagonistic to the reserve, with many sporting characters simply itching to have a crack at the rhino, and it is now thought that he purposely – and quite rightly – published figures very much below the actual number of animals. His ruse succeeded beyond all hope, for opposition died down, people began to take an interest in the fate of the white rhinoceroses, and when, ten years later, Herbert Lang, the American naturalist, made the amazing statement that there were 180 rhino in the reserve, and about thirty more on adjoining crown lands, those who wanted to rush for their rifles were very much in the minority. In course of October and November 1948 game wardens counted 550 white rhino and reported the presence of numerous calves. The animals had, by then, also spread to the neighbouring Hluhluwe Game Reserve.

When I visited the two reserves in 1961, I was told that there were over 600 white rhino in Umfolozi, and fifty-two in Hluhluwe. How pleased Vaughan Kirby would have been to see the success of the animals for whose survival he had worked so hard and schemed so cleverly! According to the very latest information available, numbers in Umfolozi have risen to about 700, which is considered too much for the 72,000 acre reserve, and at the moment of writing, two animals a week are being transported to other game sanctuaries. The white rhinoceros has thus been reintroduced into the Kruger National Park, the Wankie National Park, the Matopos National Park and the Kyle Dam Game Reserve. Specimens have also been released in the Loskop Dam Nature Reserve and the Willem Pretorius Reserve, which both lie outside the white rhino's original area of distribution.

If the species could not have been saved in southern Africa it would, as things turned out, not have been lost to the world, for in 1900 an English explorer, Major A. St. H. Gibbons, shot a white rhinoceros at

Lado on the left bank of the Upper Nile, 2,000 miles farther north than anybody had ever definitely recorded this animal. He brought the skull to Europe and his trophy created almost as much of a stir as the discovery of the okapi was to cause a year later.

Finding the white rhinoceros to the north of the equator should not have come as such a complete surprise, for as early as 1869, Theodore von Heuglin wrote: 'In the countries of the White Nile there may well occur two species of rhinoceroses: One is the common black rhinoceros, the other very probably the lighter coloured *Rhinocero simus*. We have obtained horns three and a half feet long, which could only have come from that species.'

About the same time Sir Samuel Baker saw rhino horns in Khartoum, which he considered as belonging to the square-lipped species. In fact, the British Museum was then already in possession of two horns of the northern white rhino, which had been brought back by Denham and Clapperton, the discoverers of Lake Chad, but had never been properly identified.

It seems strange such a keen naturalist as Emin Pasha – or Dr Eduard Schnitzer, to give him his real name – did not report this animal from the Equatorial Province of the Sudan, which he governed for General Gordon, for white rhinoceroses must have been practically trotting around his stations at Wadelai, Rejaf and Lado. We can only assume that he was too much engrossed in the study of birds and small mammals to pay any attention to big game.

When Gibbons' discovery became known in zoological circles, there arose the question: Was this northern form of the square-lipped rhinoceros absolutely identical with the animal found south of the Zambesi, or would there be reason to consider it as a subspecies or even a different species? As this point could not be cleared up by the study of just one single skull, Major Powell-Cotton, a famous big game hunter and owner of a private natural history museum, made a special expedition to Equatorial Africa in order to collect a few complete specimens for scientific investigation. With this material at his disposal, R. Lydekker decided that there did exist some differences between South African and Upper Nile rhino, and he named the new form *Ceratotherium simum cottoni*.

The subspecies was first thought to be restricted to the western bank of the Nile within what was then the 'Lado Enclave' of King Leopold's Congo State – that strip of land which later became incorporated partly into Uganda as the West Nile and West Madi District and partly into the Sudan. In course of time it was, however, found that white rhino not only occurred along the Nile for about 300 miles, from the Ora River in the south to Shambe in the north, but also a long way westwards, far into the Congo and French Equatorial Africa. Within the French territories they were certainly found in the regions of Goz-beida and Mongoro – southeast of Abécher – as well as near the Aouk River and at Yalinga in eastern Ubangi-Shari. Along the border between French Equatorial Africa and the Sudan there must at one time have been hundreds of them. Travelling just before and during the First World War in search of natural history specimens, Cuthbert Christy reported white rhino as more common in the Congo than in the Sudan. In the latter country there were at that time a few on the banks of the Nile and a fair number along the Nile-Congo divide, from about Yei to a point on the Bahr-el-Ghazal northwest of Tembura. In the Meridi and Yambia Districts they could even be considered fairly numerous. Crossing the Congo border, Christy first met white rhino to the west of Aba. From that point onwards he found them more or less through the whole of the Upper Welle District, with the area of Gangala-na-Bodio harbouring the greatest number.

In Aba, Christy also saw a pile of eighty to a hundred horns in the shop of a Greek trader, and he was told that they were worth one to two pounds apiece. The slaughter was already in full swing, and a few years later Guy Babault was shown more than 150 horns in Khartoum, all coming from animals that had been killed within the Chad Territory in course of just one year. No wonder that the species disappeared from eastern Chad in a very short time, while the population of Ubangi-Shari is said to have dwindled to a mere sixty animals by 1938. A recent French publication states that a few may possibly still survive in eastern Ubangi.

The Congo animals would certainly not have fared any better, if the Garamba National Park, situated to the north of Gangala-na-Bodio,

had not been created for their protection. In 1925 there were supposed to be only forty to sixty white rhino left alive in the Belgian Congo. In 1954, when I visited the Elephant Training Station of Gangala-na-Bodio, I was informed that there were 600 in the Garamba National Park, and I gather from a report published by J. Verschuren that despite the troubled times that have come to the Congo, the rhino population has now increased to about a thousand. One can only hope that the reserve is not too much affected by the fighting that is going on in that unhappy country at the time these lines are being written . . .

For many years great efforts were made to preserve the white rhino of the Sudan and the West Nile and West Madi Districts of Uganda, and at one time the slaughter of these animals was, if not stopped, at least very effectively reduced. In 1931 H. C. Brocklehurst could state that they were on the increase in the Sudan. At present there are still some white rhino in the Nimule National Park, and possibly in some other areas as well, but there can be no doubt about the Sudan Game Department having a very difficult time protecting the animals from well-armed and highly organized gangs of poachers.

In Uganda, where in 1928 Pitman estimated their number at 150, there were about 300 in 1954. The Game Department's Annual Report for 1955–1956 sounded very hopeful and gave their number as 350, with a good indication of yearly increase. But from then on, the situation deteriorated very rapidly. The report for 1956–1957 talked of continued poaching and of the animals holding their own, while the 1958–1960 report brought the dismal piece of information that the rhino of the Mount Kei Sanctuary in the northern part of the West Nile District had been wiped out by Sudanese poachers. An increase was said to have taken place in the Indi-Ogoko area, but this was possibly due to the influx of harassed animals from other regions. Since then this disastrous development has taken its course, and a recent survey gave a total of only seventy-one survivors for the whole of West Nile and West Madi! The authorities have apparently despaired of being able to do anything for the animals on the west bank of the Nile, and as many individuals as possible are now being caught and ferried across the river into the Murchison Falls National Park.

After having seen and photographed my first square-lipped rhinos in western Uganda, I was particularly keen to study the species in its southern sanctuaries. The opportunity came in 1961, when Rosanne and I made a prolonged overland journey from Nairobi to Cape Town and back, in order to have a look at some of the national parks and game reserves in the southern parts of the Continent. The Zululand Reserves figured among the most important places on our itinerary, and my expectations were keyed up to the highest pitch when we reached Hluhluwe Camp, 1,500 feet above sea level, placed on a mountain top, from where the eye sweeps over range after range of towering hills, finally to drop right down to the far away lagoons of Santa Lucia Bay on the Natal coast. The name of the 57,000 acre reserve incidentally, is derived from Umhluhluwe, the native name of the creeping plant *Dalbergia armata*.

The morning after our arrival a game scout took us straight to two white rhinoceroses. They came up a mild incline, feeding as they walked, their broad muzzles close to the ground practically all the time. The way they ate their way through the yellowish grass reminded me of nothing so much as two enormous lawn mowers. A cattle egret and a dozen glossy starlings were following the big animals, catching the insects which flew up from under their feet, and two oxpeckers climbed around on one of them. We got out of the car, and I began to take pictures as they slowly and ponderously moved closer until they were a mere dozen yards away. One paid not the slightest attention, the other occasionally snorted in our direction, but it never made a hostile movement of any kind.

The rhino hunt in the West Nile District had been full of thrills, but with the animals all too obviously under a constant nervous stress, always ready to run away, I actually learned less about their habits than I had hoped for. Watching those two rhino here in the Hluhluwe Reserve was perhaps less romantic, but they behaved almost as if we did not exist, and I had full leisure to note every detail of their behaviour.

I was impressed anew with the gigantic proportions of the animals. The square-lipped rhino is, in fact, generally considered as the third-largest land mammal after the African and Indian elephant, though

beating the Indian rhinoceros at best by only a very short length. In his description of the animal, Cornwallis Harris gave a shoulder height of up to 6 feet 6 inches, or 6 feet 8 inches, an extreme length of 14 feet, of which 4 feet are taken up by the head. Thomas Baines jotted down the rough measurements – taken by rule of thumbs – of a specimen shot in Southern Rhodesia as follows: Height at shoulder 6 feet 7 inches, total length 14 feet 8 inches, length of head 3 feet 3 inches. A large male measured by Selous stood just 6 feet at the shoulder. Some authors are doubtful of figures over 6 feet, and in Rowland Ward's *Records* a height of only 5 feet 6 inches is given. But C. R. S. Pitman, who had plenty of experience with white rhino in Uganda, considers 6 feet 6 inches as quite possible and thinks that all fully adult bulls he saw were over 6 feet high.

Apart from the greater average size, the white rhinoceros differs from the black species by having a truncated snout and broad mouth with straight lips, of which the lower one has a horny edge. The head is relatively longer, and the animal normally carries it steeply inclined. Herbert Lang, who had ample opportunity to examine in detail the specimens he collected, makes the following interesting remarks: 'The factors giving the long, weighty head such a 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 bump in front of the shoulder. At every sway of the head they exert enormous pull on the upper corners of the skull, which perhaps has brought about its curious V-shaped dorsal outline in the rear.'

Player and Feely point out that the characteristic hump is formed by muscular and epidermal tissue not supported by bone, being thus analogous to the hump of zebu or Brahman cattle. After death it decomposes very quickly and is therefore not prominent on a carcass. I have noticed that this hump varies considerably in size from one individual to another, and the research worker who recently stated that it consisted of very thick skin only, may possibly have examined somewhat

underdeveloped specimens. I never had a chance to be present at the anatomising of a white rhino, but even admitting that the skin covering this protuberance may be very much thicker than elsewhere, I cannot believe that the enormous humps I have seen on some individuals could only be masses of skin tissue, quite apart from the contrary evidence which has already be given by Lang as well as by Player and Feely.

The skin of the white rhinoceros is smoother, less folded than that of its smaller cousin. Herbert Lang calls its colour dark slaty grey, Roosevelt and Heller prefer smoky grey, and add that it is of a 'grey which can readily look whitish in certain lights'. Perhaps the person who first coined the name 'white rhinoceros' for the species, did see an animal which thus appeared unusually light, or maybe his specimen had been rolling in the sand which made it look as white as the 'black' rhinos of Amboseli usually do. There is also a theory that the Boers originally called it *wijt renoster*, *wijt* meaning 'wide' and referring to the broad mouth, and that this was in due course changed into *wit renoster*. I have discussed this possibility with a Dutchman, and he has pointed out that *wijt* would hardly ever have been used in this context. He thought that the Boers would have called the animal *breed renoster*, had they wanted to refer to its broad mouth. Efforts have been made for a considerable time to abolish the designation 'white rhinoceros' but it has probably got too much of a hold already, and the alternative most often suggested, namely 'square-lipped rhinoceros', is, to put it mildly, a bit of a mouthful! Burchell's rhinoceros would, of course, be another and probably better choice. After all, we have a Burchell's zebra!

The base of the anterior horn is not round as in the prehensile-lipped species, but straight-edged in front. It has already been mentioned that differences in the shape and length of the horns led the Bechuanas to talk of two kinds of white rhino, the common one, which they called *muchocho* or *mohohoo*, and the long-horned kind, the *kabaoba* or *kobaoba*. Of the latter, Livingstone wrote in his journal that it was 'exactly the same as the other, except that its horn is long and straight. He is found in company with the other, and is in no respect different in feeding habits.' Despite the great explorer's opinion, which he also expressed in one

of his books, long-horned specimens of the white rhinoceros were for a time labelled as *Rhinoceros oswelli.*

The record pair of horns was obtained in South Africa by Gordon Cumming; the front horn measures 62¼ inches, the rear horn 22¼ inches. The respective figures for the next-best South African pair, which is in the British Museum, amount to 56½ and 23½ inches respectively.

The horns of the two subspecies cannot be distinguished from each other, nor is there any difference in the average body size of southern and northern animals. In the skulls from Lado, which Lydekker examined, the dorsal outline was flatter than in South African skulls, the occipital crest being somewhat less developed, and the teeth were slightly smaller. Taking into consideration the enormous distance separating the two areas of distribution and the fact that there cannot have been any links between the northern and southern populations for many thousands of years, these differences are very slight indeed. Herbert Lang, for one, pointed out that they were well within the range of individual variation and expressed doubt as to the justification of giving the northern rhino subspecific status, but *Ceratotherium simum cottoni* has nevertheless been accepted by taxonomists and figures in all the text books.

From fossil evidence we know that the white rhinoceros once had a very much wider distribution, which probably extended over practically the whole of the African continent. When successive periods of glaciation came to the northern hemisphere, Africa had at times a colder and probably also much more humid climate than at present. Dense forests spread from the West Coast right across to the Indian Ocean. The occurrence of West African forest animals such as the bongo, the yellow-backed duiker, the giant forest hog, the potto and the golden cat in the few isolated forest areas remaining in East Africa can only be explained by admitting the former existence of such an unbroken forest belt. While West African animals thus had an opportunity to extend their range in an eastern direction, the white rhino, being grazers, had to retreat from the advancing forests both towards the north and the south. Their area of distribution was cut in two, and for some reason or other they never closed this gap again, when the climate became

more dry and the forests receded. The failure to reoccupy the territory which has been lost may be connected with the general decline of the rhino family, which has already been mentioned in an earlier chapter.

Bulky as the white rhinoceros is, it is still remarkably agile on occasions. When trotting, its movements look quite elegant, and in this gait the animal has been timed at eighteen miles an hour. Changing over to a gallop it is able to do about twenty-five miles, but this speed can only be kept up over a short distance. The white rhino is less of a climber than the black species and will not settle in an area of steep hillsides, even though it may cross an occasional mountain ridge in its wanderings. This probably accounts for the fact that square-lipped rhinos have only populated the southern and southeastern sectors of Hluhluwe, leaving the mountainous northern parts entirely to the black rhino. I never had the luck to see the two species together, but Mr Dean, Game Warden in Hluhluwe, told me that they get along quite amicably. Only once did he see a black rhino show some hostility towards a group of white ones, and that only for a short period. It afterwards moved off in the company of three individuals of the bigger species, browsing peacefully while they were grazing.

From Hluhluwe, Rosanne and I went on to the neighbouring Umfolozi Reserve, at present the main stronghold of the southern white rhino. We found the camp beautifully situated on Umpila Hill, overlooking the winding course of the White Umfolozi River, and a wide expanse of glorious rolling country, much less rugged than the Hluhluwe Reserve, and very reminiscent of certain parts of East Africa. As soon as we had established ourselves in one of the cosy huts, we set out to look for rhino, and in our first afternoon's drive, we saw no fewer than forty of them – one group of seven, two groups of six, the others singly or in pairs. It is one of the characteristics of the species that individuals tend to congregate in small herds, much more so than the black rhino. Such a herd as a rule consists of a bull, several cows, some young bulls, which have not yet left their mothers, as well as a few young cows. Herds of ten to fourteen can be considered as quite common, and there are records of eighteen having been seen together. In the Garamba National Park of

the Congo it is apparently unusual to see groups of more than half a dozen.

The six members of the first herd we came across were trying hard to crowd into the shade of a clump of bush. The bush not being quite big enough, some of them had, however, to stand out in the sun, despite all the shoving and pushing that was going on. They paid no attention when we got out of the car and approached to within forty yards, and even the clicking of the Leica did not disturb them in the least. It was only when I used the movie camera that their ears began to play, and as I gradually inched nearer and nearer, I could notice signs of some slight nervousness. The animals were quite obviously torn between two emotions – on the one hand they had the urge to get away from me, on the other they were very loath to leave the shade, scanty though it may have been. This brought about a rhinocerontine ballet which I am sure, would have delighted Walt Disney. They were turning around each other, trotting away, circling back, advancing towards me, retreating to the shade – a real circus performance, all the more comical because of the slightly offended expression those enormously long-headed and broad-mouthed animals always seem to wear. The show continued for some time, and they were still milling about close to that bush when we finally returned to the Land-Rover.

We did not have far to go to find a second herd, this one consisting of seven individuals. They stood a tight group among fairly high grass and bunched even closer together when I walked up to them. Finally they moved off as one compact mass of animals, in the way frightened elephants sometimes do. But they did not run very fast and stopped just as soon as they became aware of the fact that I was not following them.

Two rhino which we surprised in a wallow galloped away immediately, their little tails curled up over their rumps. After having run a short distance, they turned back, swung their ponderous heads from side to side, trotted around in a circle and continued their flight, exactly as black rhino might have done. A cow with a very small calf behaved in the same manner, and it was most comical to see her tiny offspring giving a perfect duplication of its mother's antics. As long as we were able to watch these two animls, the calf kept behind its dam, never preceding her even for a moment. But soon afterwards we came across two cows, whose youngsters – one smallish, the other very small – ran ahead of their mothers as well-educated white rhino calves are supposed to do. From what I have been able to observe, this can in fact be considered as their usual – though not invariable – mode of behaviour. It may be that very young calves are somewhat less inclined to walk ahead of mothers than older ones.

Ever since I saw Gordon Cumming's famous illustration many years ago, showing a female white rhino guiding her calf with the front horn, I had been very keen to see this actually happen. Of the females we encountered on our first drive through the Umfolozi Reserve none would oblige with a demonstration, but I was luckier a few days later, when we encountered a cow with quite a spectacular horn, accompanied by a half-grown calf and an adult animal, probably an earlier child of hers. They all three turned from side to side in the undecided way peculiar to rhino, but the cow almost immediately took charge of the situation and began prodding the other two with her horn, which she also used to direct their course, once she had got them moving. Game Ranger Letley, who was always ready to answer my innumerable questions, told me that he had on various occasions watched females acting in this way. It may not be without significance that the only black rhino cow I ever saw guiding her calf – Gladys of Amboseli – had a horn very similar in its length and forward inclination to the horns many white rhino cows carry on their noses.

The main difference between the two African rhinoceroses lies, of course, in their feeding habits, for while the prehensile-lipped rhino can be considered as predominantly a browser, the square-lipped species is almost purely a grazer. The distinctive shape of their lips and teeth, the fact that the black rhino walks along with its head only slightly below the level of its back, while the white rhino carries it low, with the mouth close to the ground, all these characteristics are most intimately linked with the way the animals get their food. In addition, this also affects their geographical distribution, for many types of habitat open to the browser are naturally closed to the grazer.

The dominant grass throughout the past and present range of the

southern white rhino is *Themeda triandra*, which stands quite high and is popularly known as 'rooigrass'. The animals will eat this to a certain extent during winter, when the veld is dry, but, generally speaking, they show a very marked preference for the shorter, shade-loving grasses, *Panicum maximum*, *Panicum deustum*, *Digitaria sp.* and *Urochloa mozambicensis*. *Panicum*, which grows to a fair height, is eaten more especially when short, and the rhino have a tendency to keep it down. *Panicum maximum* often grows around trees, and the animals graze as close to the trunks as the thorny branches will allow them to, for, unlike their black cousins, they show a considerable respect for thorns and do not like to come into close contact with them. *Urochloa* is usually grazed right down to the ground.

The habitat favoured by white rhino in southern Africa is therefore the open bushveld in which the shade-loving grasses they like so much grow particularly well. They never frequent the grassland with its continuous cover of *Themeda*. On the Upper Nile, things are somewhat different, for even though they show a marked preference for moderately thick *Combretum* forest, they can at times be met with on near-by treeless semi-cottonsoil plains, which are seasonally flooded. In the Garamba Park, they seem to frequent rather more open savannah country than in Uganda, their main requirement being the presence of isolated trees which offer them some shade for their siesta.

Places where white rhino have been grazing are easily recognised. They look as if somebody had been busy with a lawn mower, though in a somewhat negligent fashion, as there are always a few isolated tufts of *Themeda* which have not been touched. All the grazing grounds I saw in Umfolozi had a sharp, clear-cut border towards the surrounding rooigrass, a fact which added to the lawn mower illusion.

When grass is scarce owing to drought, white rhino also eat small shrubs, dwarf euphorbias and the succulent stem of a leafless creeper, *Sarcostemma viminale*, but none of these plants can be considered as really important items in their diet. Their dependence on grazing, on the other hand, may be judged from the fact they they will leave an area in which herbaceous plants are getting the upper hand over the grasses.

With Ranger Letley acting as our guide, we went off the main tracks

and down to the banks of the White Umfolozi, where we not only saw plenty of rhino spoor with foot marks almost twelve inches across, but also the imprints of the wrinkles on the skin where an animal had rolled on the sand. The Umfolozi rhino are said to drink once every twenty-four hours, though they are probably able to go without water for two days. In winter they come to the water mainly at night, but during the hot season they will drink at all times of the day.

We found the bush criss-crossed with a regular maze of rhino tracks, along which there were enormous dung-heaps, much bigger than any I had seen even in the areas most densely populated with black rhino. The dung is of a much finer, more thoroughly digested consistency, greenish when fresh, becoming blackish on the outside when dry and hardening. White rhino scrape in the same way as I have described for the black rhino, not throwing the feet like a dog, but pushing them backwards one at a time. Any individual happening to pass a dung-heap seems to be stimulated to add its own quota to the pile, which may eventually measure several yards across.

In their excellent report on the white rhino of Umfolozi Player and Feely have made some remarks which are of considerable ecological interest: 'The dung-heaps feature in the environment of many other animals which either visit or live in them. First, there is the invertebrate community living in the heap, the most obvious of which are the dung beetles. The larvae of beetles are very numerous, and butterflies regularly visit to feed. Secondly there are the birds and mammals which take advantage of the concentrated food supply offered by the invertebrate residents. The banded mongoose, is a regular visitor, feeding particularly on the beetle larvae. Other insectivorous animals such as shrews, moles and aardwolf probably also are attracted. The following birds have been seen feeding in heaps: crowned guinea fowl, crested and Natal francolins, hadedah ibis, European roller, black-crowned tchagra, and red-shouldered glossy starling. The game birds also dust bathe in heaps. All these animals soon reduce the dung to a uniform, chaff-like consistency. When the dung beetles are active, the heap appears to be a heaving mass as hundreds of beetles work and push. The harvester termites will be seen carting away the undigested grass stems to their nest.'

The bull urinates in the same peculiar manner as has been described in the chapter on the black rhinoceros, but I have never seen one eject as many puffs of spray as the males of that species often will.

Next to the dung-heaps, the many wallows are certainly the most striking feature of the white rhino country. I have seen them wallowing in the afternoon and at dusk. Schack's wonderful flashlight photographs show that they also do so at night. In hot weather they often take a mud bath about three hours after sunrise, retiring into the shade soon afterwards in order to sleep till the late afternoon. They then begin to feed again, mostly continuing to do so all through the dark hours. In winter they spend most of the morning and a considerable part of the afternoon grazing.

Near some of the wallows, I saw trees covered with wet mud, and some trunks had acquired a smooth and shiny polish, giving evidence of generations of animals having rubbed against them after a prolonged and very satisfactory mud bath. Freshwater turtles inhabiting these muddy hollows have been seen picking ticks from the skin of rhinos, both white and black, as well as from warthogs. Letley told me that in the river pools there are two species of fish—one of them a *barbus* – which do the same.

The ticks which were mentioned as common parasites of the black rhinoceros, *Dermacentor rhinocerinus* and *Amblyomma rhinocerotis*, have been collected from individuals of the white species as well, besides *Amblyomma hebracum*, *A. variegatum*, *Rhipicephalus maculatus*, and *R. simus*. The animals also suffer from the attention of biting flies, especially *Lyperosia*, which Herbert Lang mentions as a characteristic companion of white rhinoceroses. In the Welle District the parasitologist Rodhain found their stomachs infested with the larvae of a bot-fly, *Gyrostigma pavesii*, which lays its eggs upon the skin of the rhino's head, neck and shoulders. The maggots then probably crawl around until they reach the mouth and finally fix themselves to the walls of the stomach by means of hooks. When they are ready to pupate, they are shed with the dung. Apart from fly larvae the intestines often contain an astonishing number of round-worms and shortish tape-worms, which do not seem to bother their host in any way.

The square-lipped rhino's sense of smell is as keen as that of its cousin. It has been stated – quite correctly, I think – that it can detect a man a good 800 yards away. Near a drinking place it will immediately perceive human scent which is less than an hour old, and in areas where the animals do not feel safe from persecution this is enough to send them galloping away. All authorities agree that their eyesight is poor. In Umfolozi we once had the Land-Rover parked on a bush track used only by the staff of the reserve, when we suddenly discovered two rhino approaching from the left. They could not smell us, as the wind blew strongly in our direction, and we kept perfectly quiet. As they reached the edge of the track, some way in front of the car, they both stopped, swung round towards us and raised their heads. After facing us for half a minute or so, they turned back and trotted through the bush, describing a half circle and crossing the track over 150 yards away. They had somehow become aware of our presence, and I can only imagine that they must have seen the dark mass of the stationary vehicle. I afterwards paced the distance and found it to be just over twenty-five yards. The limit of their effective range of vision may therefore lie somewhere between twenty-five and fifty yards, and this is also the opinion expressed by Foster. He considers hearing as the white rhino's most important sense, more important even than the sense of smell. This may be saying quite a lot, but I am personally convinced that it is much better than some authors have assessed it to be. When the animal becomes alarmed, its ears turn and twist incessantly, and we must not forget that the olfactory sense, phenomenal as it may be, cannot give any warning in the case of danger threatening from down-wind. Whatever is approaching from that side can only be detected through the sense of hearing.

When accompanied by oxpeckers, white rhino pay as much attention to their screeching as do their black relations. 'The reaction of rhinos to the alarm note of red billed oxpeckers is always immediate,' Player and Feely write. 'When two or more animals are together, they immediately raise their heads and ears and stand with their buttocks touching, facing in different directions. A few nervous steps may be taken. If they suspect anything futher, they then break away from where they think danger to

be. Whether the oxpeckers ever react consistently to animals other than man is not known.'

Apart from oxpeckers, I have seen cattle egrets and glossy starlings in attendance. According to J. Verschuren, the white rhinos of the Garamba Park are often followed by carmine bee-eaters; they catch the insects swarming around the big beasts, on the backs of which the beautiful red birds occasionally settle.

In its temperament the white rhino differs considerably from the smaller species. It is a placid and inoffensive creature, and even where harried by poachers, as in the West Nile District of Uganda, its only desire is to get away from anything that arouses its suspicion. The agressiveness of the black rhino has often been overstressed, as I have pointed out in another chapter; but the animal quite definitely has an uncertain temper and unprovoked charges do happen. As far as the white rhinoceros is concerned, genuine attacks on human beings have been very rare indeed, and in the few known cases the fault has not been with the animal. Dean knew of only one fatal incident in Zululand. A rhino had wandered out of the reserve and was being chased down a narrow path by a howling mob of natives. Meeting a woman coming up that same path, the fear-crazed beast slit her open with its horn and trampled her body. Two or three similar accidents have been reported from Uganda and the Sudan. Of the tens of thousands which have been shot, very few really charged. There are, of course, no rules without exception, and William Cotton Oswell tells how he and his horse were thrown up in the air by a white rhino he had wounded. As a whole, killing these animals seem to have entailed not much more danger than shooting a domestic cow.

In the Zululand reserves, mating takes place all the year round, but seems to be most frequent from July to September. In Uganda, signs of mating are, according to Heppes generally noticed between February and May. Player and Feely think that the female attracts the bulls by leaving a distinctive odour along the paths she uses. Most observers report terrific battles between bulls courting the same cow, and such duels quite often end in the death of one of the combatants. Of thirty-two rhino found dead in Umfolozi between 1952 and 1957, most had

died of wounds received in fighting and about half were adult males. Within a herd accompanied by a big bull there is said to be considerable latent hostility towards the male on the part of the females, who savagely repulse attempts at mating and may even kill the bull in the process. What I know of the habits of the black rhinoceros makes me wonder if such fights between animals of different sex could not be an integral part of mating behaviour. Nuptial fights probably take place among white rhino as regularly as they do in the case of the black species.

The bull mounts a cow a number of times while she is in heat, and males have been known to remain mounted for over an hour. Foster was able to keep a close watch on a cow with a split horn and came to the conclusion that the gestation period was of 547 days' duration. Maurice Burton quotes 548 to 578 days. There is usually a single calf, but Player and Feely once noted the occurrence of twins. Selous, too, reports having seen a cow accompanied by two calves of equal size. The calf follows its mother within twenty-four hours of having been born, and stays with her for four to five years. There is some evidence to show that cows become mature quite early, being able to breed before they are fully adult.

At the time of writing these lines, no young white rhino has yet been born in captivity, even though couples have now been kept in several zoological gardens for a number of years. The birth of a calf has recently been observed in the Loskop Dam Reserve in Transvaal, and no doubt we shall soon hear of somebody having been successful in breeding the species in a zoo.

The calf has a very strong attachment to its mother, which remains unshaken even after her death. In the Umfolozi Reserve the skeleton of an adult rhino was found between two rocks where the animal had obviously got stuck, wedging itself in more and more firmly in its frantic struggles. Close by were the bones of a calf that had stayed with the remains of the cow until it died of starvation. Several calves have been saved from a similar fate by being captured while standing beside a carcass, sometimes as much as a week after the parent's death. In one case a game guard found a calf, an adult bull, and a half-grown male alongside a dead cow. As he approached the pathetic group, the two

older animals vanished, but the youngster held its ground and could not be driven away. The following day the calf was not around, but game guards posted near the carcass reported that it came back later and chased away the vultures which had congregated on the dead beast. It was finally captured and transported to the National Zoological Gardens at Pretoria, where it became well-known under the name of 'Folozi'.

This strong urge to keep close to mother, which has already been mentioned in connection with the black rhinoceros, is a protective mechanism that keeps the calves from straying and falling easy victims to lions, hunting dogs and hyenas.

In 1946 an effort was made to drive several Umfolozi rhino which had wandered off on to a strip of Crown Lands, back to the reserve. In course of this operation a cow was found to have left her very small baby close to a well-known hyena cave. A game guard was told to keep watch near the little animal and, if necessary, to protect it from predators until the mother came back. As she never showed up again, the female calf, which was about six days old, weighed 105¼ lb. and stood 23·4 inches at the shoulder, was sent to Pretoria, where R. Bigalke, the Director of the Zoo, made full use of this opportunity to study the development of a young white rhino. At eighteen months, 'Zuluana', as the calf was called, weighed 1,013 lb. and was 39·1 inches high at the withers, while her anterior horn had grown from 0·1 to 3·2 inches. An analysis of the data obtained seems to point to a rate of growth increasing steadily during the first five months, after which time it slows down. Up to the age of four months, the calf was hairy all over, quite especially so at the base of the toes and on the lower forward surface of the legs. At fifteen months, hair could still be seen on the back and along the sides. The thick black toe nails were worn down and replaced by a new and permanent set, the change on the middle toe taking place at 281 to 282 days on the forefeet and at 358 to 371 days on the hindfeet. The outer horny layer of the skin of head and body was shed between one and a half and four months, a considerably paler covering taking its place. Another change of skin was observed when the animal was ten months old. The hump was seen to develop out of three skin callosities,

which merged with each other after about six months, two transverse groves – which according to Player and Feely, can be seen in almost all white rhino – remaining as an indication of this three-lobed origin.

There were many young rhinos to be seen in Umfolozi at the time of my visit and I got the impression that cows with small calves quite definitely tend to keep to themselves. They only begin to associate with former calves or with whole herds when the present offspring is half or threequarters grown. To be a member of a herd has its serious dangers for young animals, as they may be attacked and even killed by a big bull. The risk of rough treatment is especially great whenever the cow comes in heat, and males have been seen chasing around youngsters who squealed loudly while attempting to escape.

In my rather limited experience with white rhino I have only heard an occasional puff or snort, but observers who are in frequent contact with these animals, declare them capable of uttering a wide range of sound. A calf separated from its mother squeals like a pig. Bulls grunt and snort when following a cow and give vent to elephant-like blasts of trumpeting when repulsed by her. Two rivals going for each other usually punctuate their attacks with deep bellows. A solitary individual walking along its habitual path may snuffle, snort and squeak as if talking to itself, and there is always a lot of noise when a number of animals meet at a water-hole or a wallow during the night.

An indication as to the longevity of the species is given by the fact that at the time when Player and Feely published their valuable paper, a cow in the Umfolozi Reserve, known to be thirty-six years old, was still producing calves. There is no reason why the white rhino should not have as long a life-span as the elephant.

It has already been mentioned that quite a number of individuals get killed in fights with their own kind. Becoming trapped in a mud hole, falling over a cliff, drowning in a flooded river or becoming stuck between rocks are other recorded hazards which may lead to a premature death. There is also a reliable account from Zululand of a bull elephant stabbing and killing a white rhinoceros. Elephants disappeared from the Umfolozi and Hluhluwe areas a long time ago, but they are common in the Kruger National Park, and it will be interesting

to see how the rhino released in this magnificent game sanctuary will react to the presence of these large mammals, which they have never met before. In the Nimule Reserve of the Sudan, white rhino have been seen enjoying the shade of a tree close to a herd of elephant. They generally pay very little attention to other animals and will sometimes graze right in the middle of a herd of buffalo. In Murchison Falls, a park vastly over-populated with elephants, some sixteen white rhinos appear to have settled down happily.

J. B. Heppes, former Game Warden of the West Nile District, reports having had no evidence of clashes between rhino and lions. But, as Herbert Lang found a calf killed by two leopards in the Congo, we can assume that lions, too, may occasionally account for a calf or a half-grown animal. In Natal, lions were exterminated as early as 1865, and a single specimen, which came wandering south from Portuguese East Africa a few years ago and took up residence in the Umfolozi Reserve can hardly be considered as affecting the rhino in any way. The big cats will be another problem the individuals transported to the Kruger National Park will have to face. I would give a lot to witness the behaviour of a white rhino on getting its first whiff of lion scent.

Oborgi, a white rhino calf orphaned in an early rescue operation in West Nile and moved to Murchison Falls after her mother died, was kept for two years close to the Warden's office. When eventually she was persuaded to move off into the wild by herself she was immediately attacked by lions who had undoubtedly sniffed around her for a long time when she was safe inside. She recovered and survived to make a successful return to the wild later on.

The species very fortunately does not seem to suffer from many diseases. It is immune to rinderpest, and the numbers killed by anthrax have always been very small. The greatest threat to survival comes, as usual, from man!

5 The Last of Their Kind

1 *The Sumatran Rhinoceros*

'And here,' said the Assistant Director of the Basle Zoo, 'is our very special treasure – a Sumatran rhinoceros!'

I was as thrilled as, I suppose, most people must be when they get their first view of the Mona Lisa, the Venus de Milo, or the Acropolis. There it stood, not much bigger than a tapir, rather short of body, and covered with long, dark-brown hair. I had to think of a cross between a rhinoceros and a bear – no, that was too fanciful! – but a young woolly-haired rhinoceros might have looked somewhat like that. The animal in the enclosure had two horns on its nose, just like the Ice Age species, but there was, of course, no woolly underfur.

'We got it from the Siak River area in Sumatra,' the Assistant Director explained, 'it is a young female, just about full grown.'

I nodded and took my camera out of its case, for I wanted to have a memento of this first live Sumatran rhinoceros I had ever seen. Would it also be the last? While I snapped a picture I had to think of the sad fact that there were only about a hundred, certainly not more than a hundred and seventy survivors of this species in existence.

'The Copenhagen Zoo also has a female,' I heard my companion continue, 'if only I could get a male – perhaps we might be successful in breeding this species as we have been with the Indian rhinoceros. It could well be the one and only hope for the preservation of the Sumatran rhinoceros.'

Yes, it could well be the one and only hope, I thought. The strange milu, or Père David's deer, of China, which I had just seen in an

adjoining enclosure, had, many years ago, been saved from total extermination thanks to the Duke of Bedford getting a few specimens for his private zoo. Now the Chinese were re-introducing milus bred in Europe into their original homeland! But when the Duke got his deer, there was still a whole herd of them, easily accessible within the walls of the Imperial Gardens of Peking. As far as the Sumatran rhinoceros was concerned, the task was going to be much more difficult, for the few survivors were known to be scattered far and wide over an enormous area of jungle.

If somebody could only have foreseen the catastrophic turn of events with regards to wildlife in general and rhinoceroses in particular a hundred years ago. For, during the last century, Sumatran rhinoceroses were fairly frequent guests in zoological gardens and menageries. In the London Zoo more than a dozen were on view at one time or another, and a specimen caught near Chittagong lived there for many years. Breeding the animals would probably have been quite easy, for several were actually born in captivity. A cow sent to England from Singapore gave birth to a calf on December 7th, 1872, just as the ship was about to dock in the Port of London. She unfortunately killed her offspring three days later. In the Calcutta Zoo calves were born on January 30th, 1889, and in February, 1895. The latter was sent to Hagenbeck's Zoo in Stellingen near Hamburg together with its mother, both animals later becoming inmates of Barnum and Bailey's famous menagerie. Considering the fact that today a Sumatran rhino is almost worth its considerable weight in gold, one shudders to think of all the lost chances. How easy it would have been to build up a stock of these creatures in a safe, well-controlled place!

The Sumatran rhinoceros, *Dicerorhinus sumatrensis* – or *Didermocerus sumatrensis*, as some authors now call it – originally had a very extensive area of distribution, which included parts of Bengal and Assam, the whole of Burma, the hill country of Siam (Thailand), Indochina (Cambodia, Laos, Vietnam), Malaya, Sumatra and Borneo. All over these eastern lands the species has endured merciless persecution, rhinoceros hunting having been an extremely remunerative occupation for centuries past. J. C. Brasser, a Dutch officer stationed in Sumatra

before the First World War, had one of these native hunters in his employ as a tracker and guide. The man was the son of one of the most famous *pawang badak* (rhinoceros hunters) of the area, and he told the officer that his father had spent half his life up in the mountains, together with a few other adventurers, and sometimes bagging as many as two rhinoceroses a month. Gunpowder being very expensive in those days, the *pawang badak* did not often use their muzzle-loaders but preferred to dig pits in the deeply worn game paths crossing the ranges, or to stick sharp pointed stakes into the ground at the bottom of especially steep parts of the trails, so that a descending rhino would impale itself. No wonder that Brasser found the animals extremely scarce in the mountains, where the local hunters preferred to operate. They were slightly more numerous in low-lying, swampy areas.

Elsewhere, the two-horned Asiatic rhinoceros was first exterminated in the plains, holding out somewhat longer in densely wooded mountain areas. E. H. Peacock, writing in 1933, stated that the species which had once been fairly common throughout Burma, was thinly distributed near the watersheds of most of the important hill systems from Myitkyina in the north to Victoria Point in the south. In Malaya it was at that time becoming limited to the main range and its higher foothills, with a few beasts surviving in various swamps of the flat or semi-flat country. As far as Borneo is concerned, Eric Mjöberg, the Swedish zoologist, put it on record that he only found rhino in the most inaccessible tracts, into which even the natives rarely ventured.

'The nomad tribes wandering through the central districts of Borneo are very keen rhinoceros hunters,' he wrote in 1930, 'the Punans follow its trail noiselessly and shoot poisoned darts from their blow-pipes at the more vulnerable parts of its body. Relentlessly they will pursue one and the same animal for weeks until they get a chance to blow a dart at it. . . . The fate of the rhinoceros should soon be sealed in Borneo, for every year a very large number are killed. . . . At the twelfth hour, the Sarawak Government – acting on the author's recommendations – had introduced certain restrictions on rhinoceros hunting, but they are not enforced strictly enough. . . . It is, of course, true that the rhinoceros

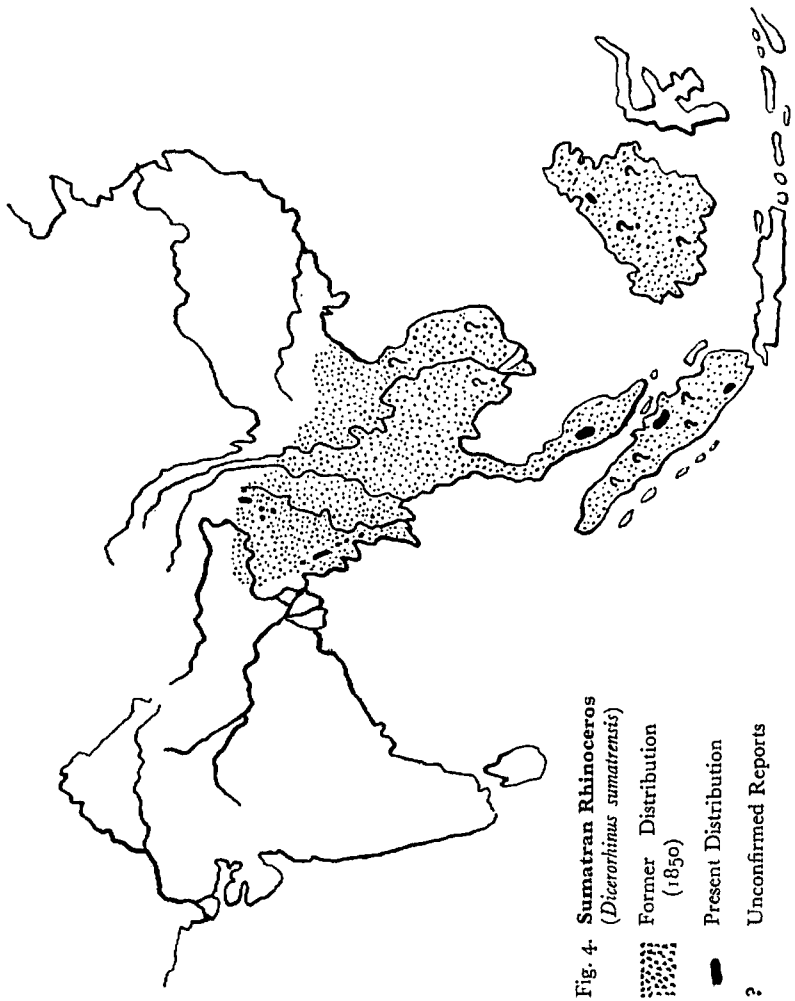


Fig. 4. **Sumatran Rhinoceros** (*Dicerorhinus sumatrensis*)

also occurs in Dutch Borneo, but apparently not in such numbers as in highly favoured Sarawak!'

And how are things today? Lee Talbot, who during the mid-fifties made a survey of all three Asiastic species, could not get any positive evidence of the Sumatran rhino's existence in Bengal and Assam. His investigations in Burma led him to the conclusion that the whole population consisted of between thirty-five and forty-six individuals, scattered from Kachin State to Tenasserim and Shwe-u-duang. He later received a report – which he considered reliable – that there were about thirty more to be found in the Kaimaing Sub-Division of Kachin State. 'The Sumatran rhinoceros is an extremely rare animal in Burma,' he writes, 'The widely dispersed survivors are being hunted down constantly, and unless effective measures can be taken soon, there may be no survivors in a few years' time. Small as Burma's rhino population is, it is still the largest known.'

Reports from Siam and Indochina are extremely vague and it is difficult to decide to which species of rhino they refer. It seems probable, however, that some individuals of the Sumatran rhino survive in southern Siam. In Malaya a few still roam through the sparsely inhabited forests of the north. Everywhere else, they have been exterminated, except possibly in Johore.

The news Talbot received from Borneo confirmed the fears Mjöberg had expressed in 1930, for Tom Harrisson, the well-known director of the Sarawak Museum, told him that there were almost certainly not more than two left alive in the country, with possibly a few more in the eastern part of North Borneo and in the Iwan-Bahan tract of former Dutch Borneo.

In course of a foot safari through the South Sumatra Reserve, which in 1938 was thought to contain a population of thirty, Talbot saw fresh spoor in five places. The existence of the species was reported to him from various other parts of the country – from the Losei Reserve in the north, and from locations in Tapaunly, Djambi and Blankuku. He finally arrived at the following verdict: 'The rhino is very rare in Sumatra, but in my judgement not so rare as recent estimates would indicate.'

Since then the number of two-horned rhinoceroses on the Siak River, where Basle and Copenhagen got their specimens, has been estimated at forty to sixty individuals.

As has been mentioned before, the Sumatran rhino is the smallest of the five surviving species, with a length of 8 to 9 feet, and standing 4 feet to 4 feet 6 inches at the shoulder. An old female from Malaya was even smaller, reaching a height of only 3 feet 8 inches. The girth of a big Malayan male, measured directly behind the shoulders, amounted to 96 inches. The record front horns mentioned by Rowland Ward have a length of $32\frac{1}{8}$ and $27\frac{1}{8}$ inches, being followed by a horn of only 15 inches. An anterior horn of over 10 inches and a posterior one of over 5 inches can quite definitely be considered as above average. Females have considerably smaller horns, the posterior one often being a mere protuberance. Such specimens can easily be mistaken for a one-horned Javan rhinoceros, and this has led to a lot of confusion with regards to the past and present distribution of the two species.

The skin of the Sumatran rhinoceros is rough and granular, though smoother than in the Indian and Javan species, and there is a conspicuous fold behind the shoulders which reaches across the back. In younger animals the body is covered with bristles varying from red-brown to black, and there are hairy fringes on the ears. Most of the hairs are lost with advancing age.

The eyes are small, the ears short and rounded, and the upper lip is prehensile, though less so than in the Javan rhino.

Despite the fact that the first European settlements in the Malay Archipelago date back to the sixteenth century, the existence of the two-horned Asiatic rhinoceros was not recognised before 1793. At that time there existed in southwest Sumatra a small British Colony known as Benkulen. Founded in 1685 as a trading post of the British East India Company, it was finally handed over to the Dutch in 1824. Towards the end of the eighteenth century, a surgeon by the name of William Bell was stationed at this settlement. One day he had an opportunity of examining a rhinoceros that had been killed about ten miles from Fort Marlborough. He made copious notes, from which he afterwards compiled a 'Description of the double-horned rhinoceros

of Sumatra'. Bell's paper was published in the Philosophical Transactions of the Royal Society, together with several drawings, and in this way the animal became known to zoologists. Bell omitted to give it a scientific name, but it is certain that his description served as a basis, when the new species was duly recognised. According to most authors, the specific name *Sumatrensis* was given by the famous Cuvier in 1817, but this is not correct, as it was actually used three years earlier by the zoologist G. Fischer.

In course of the last century several Asiatic two-horned rhinoceroses were described, one of them on the evidence of a single horn of unknown origin! It has, of course, long been recognised that there is in actual fact only one species, but there may perhaps be some justification for distinguishing two sub-species – the Sumatran rhinoceros proper, *Dicerorhinus sumatrensis sumatrensis*, from Sumatra and Borneo, and the Chittagong or hairy-eared rhinoceros, *Dicerorhinus sumatrensis lasiotis* from Bengal, Assam, Burma, Siam and Malaya. Specimens from the Malay Archipelago seem to be rather greyer, less hairy and possibly somewhat smaller than those from the mainland. The description of the 'hairy-eared' rhino was based on a young female which was captured near Chittagong in 1869 and became an inmate of the London Zoo in 1871. It had at that time a drooping fringe of hair on its ears, some 5 inches long, but when it died around 1900, this adornment had long since become reduced to the short bristles found in all adults. There is probably no valid reason for separating the rhino of Malaya, Burma, Siam and Indochina from the Assamese ones, as has been done (*Dicerorhinus sumatrensis niger* – the Malaccan rhinoceros) by some authorities.

What we know of the life and habits of this strange relic from the Tertiary Age we owe mainly to game wardens and sportsmen-naturalists like Theodore Hubback, G. H. Evans, W. S. Thom and E. H. Peacock. Hubback in particular spent a lot of time studying the Sumatran rhino of the Malayan forests and not only published the most complete monograph of the species, but also illustrated it with photographs of rhinoceroses in their natural habitat, taken at a jungle salt-lick. The difficulties he was up against in these investigations are well illustrated in the following extract from his excellent paper: 'There

was an old rhinoceros in a very remote part of the Malayan jungle, of which I wanted to make an intensive study. I tried to. I followed on his fresh tracks for an accumulative period of forty days, spread over five separate expeditions after him. I heard him three times, was very close to him several times, but saw him never. His habits were fairly regular until he became alarmed and then he was the cunningest thing in the jungle. The country he frequented was not high but extremely steep and covered with thorns of many sorts. The worst obstruction was a palm (*Calamus castaneus*), called chuchor by Malays. It grows in dense clumps to a height of about ten feet, and is very thorny. This palm jungle was interspersed with rattans of several varieties and most of the terrain followed by this rhino, when it was alarmed, was along steep hill sides heavily wooded and covered with chuchor. Directly he knew he was being followed, he tried every trick known to rhino to give us the slip. He never stayed for any time in his wallows – to make up for it he wallowed frequently – and he continuously made huge circles coming back on his tracks about once in two days. One day he came close to a camp which had been used by us two days previously. Some way off he became aware of the proximity of the old camp and stopped before he came to the banks of the river which separated him from our camping place. He then turned back and went in another direction. His habits seemed to indicate that he was very old. He had a track which measured nine and a half inches across, exceptionally wide for a *sumatrensis*, with short toe nails. . . . He never ran far but he never seemed to stop. A fast walk which he could keep up for miles defeated us. When we did get up to him and he got away without our seeing him – that was always – we knew that it would be two or three days before we would have a chance of getting close to him again. We used to track him all day, camp on his tracks at night, and off again early next morning; still he defeated us.'

This description makes it quite clear that the Sumatran rhinoceros lives in the thickest and roughest jungle imaginable and that it will literally go 'through thick and thin' – through densest undergrowth, over fallen trees, and up steep hillsides. It is, in fact, an expert climber, able to negotiate tracks of country neither elephants nor gaur would

travel through. Following rhino tracks in the Burmese mountains, where the animals go up to 4,500 feet, Thom often had to hand his rifle to a follower in order to climb hand over hand up the steep banks the animals had ascended, and he does not hesitate to call them 'as active as goats'. He noticed that they occasionally moved towards flat country, especially near the end of the rains, but considered the hills as their true habitat. In Sumatra tracks were found at an altitude of 6,560 feet, by von Rosenberg, the German explorer.

Sumatran rhino are very fond of wallowing, doing so once or twice every day, more often in hot weather. The wallows Hubback examined sometimes consisted of a mere hollow in swampy ground, but they were more generally situated under a bank, in which case they had probably been dug by the animals themselves. Hubback thinks that in doing so they made more use of their horns than of their feet. 'Before the days of intensive rhinoceros destruction in Malaya,' he writes, 'it was possible to find a regular battery of rhinoceros wallows in one place, as many as seven or eight would be found under a bank, all in use. At one salt-lick in Ulu Pahang, a salt-lick well patronised by rhinoceroses in their palmy days, I found no less than five large wallows in a series, almost touching each other. Near another lick were eight. They are no longer used. To adapt two lines of Tom Moore's poetry one might say: The pits are still there – but the rhino have gone. Around the wallows, bushes and tree trunks are often plastered with mud.'

In the Arakan Hills of Burma, where there are no wallows, only swift flowing streams full of rocks and cataracts, the rhino bathe in natural pools at the foot of waterfalls. Frequently they like to walk in rivers and are very good swimmers.

Sumatran rhinoceroses usually wander around in a solitary state, except for a bull following a cow, or a mother with a calf. On one occasion Hubback got on to the tracks of three and found that he was dealing with a jungle version of the eternal triangle. Two of the animals finally had a tussle, whereupon one went its way alone, while the other two continued together. On the headwaters of the River Boh in Central Borneo, Mjöberg once came across four rhino, of which three immediately ran away, while the fourth broke through the line of his porters,

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exactly as the black rhino of Africa used to do in former times. It was probably a case of running in the wrong direction, quite without any harmful intent.

Most sportsmen and naturalists who have studied the Asiatic two-horned rhino in Malaya, Burma and Borneo came to consider it as a shy and harmless beast. It comes as quite a surprise to learn from Lee Talbot that in Sumatra the species is widely feared as being potentially aggressive, with a reputation for aggressiveness even more sinister than that of the much more impressive Indian rhinoceros. In Burma, too, some natives seem to consider it as a dangerous animal, but Major Evans, who spent a good number of years in that country, only twice heard of unwounded animals becoming troublesome. On one occasion two rhino held up a party of survey coolies in the course of their work. On another, a rhino chased a gun-bearer who managed to climb a tree, but not before the animal had bitten him. The Burmese told Evans that, in attacking, the rhino use their incisors very freely, but will also toss and trample an adversary. On the whole, one gets the definite impression that the danger attributed to the species is mainly fictitious, being probably based on the occasional wounded animal turning on its attackers.

Like all other rhinoceroses, the Sumatran species depends on its extremely well-developed sense of smell, as well as on its hearing. A native hunter told Hubback on no account to break even the smallest twig along the trail when following a rhino, as the sound would immediately put the creature on guard.

In the dense jungles there is much less movement of air than out on the African plains, and human scent can probably be detected from almost any direction at a sufficient distance to give the animal a chance of escaping. The eyesight is poor and would anyway be of little use in thick cover. It is interesting to speculate on the probability that rhinoceroses and elephants have bad sight because their ancestors were forest dwellers for millions of years.

The Asiatic two-horned rhinoceros has no very definite feeding periods, but it does usually move about early in the morning and after sunset, spending the hot hours asleep. It can be found wallowing at any

time of the day. In Malaya, the animal finds its food-plants only in virgin forest, or in very old regenerated forest, never in secondary jungle. It feeds on branches, shoots and creepers, on bitter and astringent fruit, on the bitter leaves of the Manai shrub (*Urophyllum sp.*). In Burma it eats bamboo leaves, as well as the flowers and fruit of the kayuwa bamboo (*Melocanna bambusides*). The rhino is especially fond of fruits of plants belonging to the genus *Mangifera*, and of a fruit with thick, sticky, creamy juice, which comes from a tree known as mengult or salut. Among the trees it likes to browse on, are various species of the *Sapotaceae* family, the Eugenia tree and several trees containing gum.

In order to get at the twigs and branches it will break down a young tree by pushing against it with forehead or chest until it bends over to such a degree that the animal can walk it down by pressing it under its belly. In the case of a large tree, it may even use the forefeet to hold it down, while eating. It bites off twigs as thick as a little finger, while saplings from one to three inches in diameter are twisted off with the horn.

'A favourite trick of the rhinoceros when feeding is to get a sapling behind its front horn,' Hubback writes, 'and twist it round and round until it is thoroughly decorticated and covered with mud from his head. I do not know exactly how this is done, never having caught a rhino in flagrante delicto.' This peculiar habit is also mentioned by Peacock, who studied the species in Burma.

Hubback saw a rhino eat lichens or fungi off a fallen tree but he never had any evidence of grazing. In Burma, however, it has been known to feed on the long, feathery pyaung-sa grass. The old bull Hubback tracked for such a long time seemed to have very worn teeth for, when it pushed down a tree, it only fed on slender twigs and left the branches untouched. On the other hand, the bull ate large quantities of fruits which he could swallow easily.

Sumatran rhinoceroses have a strong tendency to stick to certain trails, and many of these paths have probably been used by countless generations of animals. Brasser saw these paths in the mountains of Sumatra, washed out by the rain to a depth of five feet. In Malaya, Hubback found paths worn into limestone strata, and in one place a

small boulder more or less blocking the fairway between two rocks had been polished as smooth as a sea-pebble by innumerable rhino-bellies rubbing over it. Hubback never noticed any accumulations of dung and only once had evidence of a rhino having returned to deposit its droppings in a particular spot. Peacock, however, reported this habit as well-developed in those parts of Burma, where the animals were not unduly disturbed. He came across dung-heaps two feet high and four feet across.

After defecating, Betina, the specimen kept in the Basle Zoo, made the same backward scraping movements that can be observed in other species. When lying down, she pushed around the straw with her fore-feet, as if she were arranging a nest. One could well visualise a rhino doing the same with the fallen leaves covering the jungle floor. The only sound she ever produced was a thin, high peep. I never heard it, but I imagine that it must have been very similar to the sound Pixie uttered when he thought he had lost his mother.

When suddenly disturbed, the Sumatran rhinoceros snorts, and when thoroughly alarmed, it gives vent to a loud, whistling, braying sound, not unlike the braying of a donkey. Walking along quietly, it squeaks, and when it rolls comfortably in the mud of its wallow, it not only snorts, grunts and blows, but also makes a low, plaintive, humming noise, more like something that might be produced by a bird or a gibbon.

Very little is yet known regarding this animal's reproduction. In a note on the birth of a Sumatran rhinoceros aboard a ship in the Port of London, Bartlett suggested a period of gestation of eight months, and that figure has been widely quoted ever since. This would be a tremendously short time for such a big animal, and it is so far removed from the known gestation periods of the black, white and Indian species, that it cannot possibly be considered as correct. Maurice Burton is certainly very much nearer the truth in assessing it at 510 to 550 days.

The calf born on the steamship *Orchis* was three feet long and two feet high, weighing an estimated 50 lb. Its dark skin was covered with crisp black hair. The ears were hairy inside as well as outside, and the tail had quite a brush at the tip. The high legs, long head and meagre

Black rhino cow and calf.

White rhinos, the hump on the neck is clearly visible. Umfolozi reserve.

White rhino in the Hluhluwe reserve. 'Eating its way through the yellow grass like a gigantic lawn mower.'

White rhinos at Hluhluwe, Burchell called them 'flat-nosed rhinoceroses'.

body made the little animal look somewhat like a donkey. The front horn was about three-quarters of an inch in length; the position of the posterior horn being only indicated by a smooth spot. The hoofs were long and pointed, their points soft and turned inwards, covering part of the sole of the foot. This turned-in part obviously gets worn away very soon. The nails of the Sumatran rhinoceros become shorter and shorter the longer the animal lives, footprints thus giving a certain indication as to the age of the individual that made them.

From the scanty evidence gathered by various observers it seems certain that the calf remains with its mother until it is almost full grown. For more definite information we have to wait until a zoological garden can announce the birth of a young Sumatran rhino. This would not only help to complete the animal's life-history, but it might be a first step towards the effective preservation of this very threatened species.

11 The Javan Rhinoceros

The Javan rhinoceros, *Rhinoceros sondaicus*, at first sight resembles its well-known Indian cousin, but it is of a somewhat lighter build and has a considerably smaller head. There is a record of a bull standing 5 feet 10 inches at the shoulder. An old male from Perak measured 5 feet 5½ inches, while Blanford gives the height of a big female as 5 feet 6 inches. In actual size the two species are thus almost equal. The skin of the Javan rhinoceros does not show the tubercles so characteristic for *Rhinoceros unicornis*, but has a cracked and scaly appearance. This mosaic-like pattern is very well visible in the photographs of several specimens killed in Sumatra, which J. C. Hazewinkel published in 1933. The surface of the body is divided into shields by deep folds. Of these, the neck folds are less developed than in the Indian rhino, while the ones in front of the shoulders are joined across the neck. In *Rhinoceros unicornis* they turn backwards and end behind the shoulders. The colour of the skin is dusky grey.

The single horn is always small, not much exceeding 10 inches. The

two longest listed by Rowland Ward are 10¾ and 10⅝ inches respectively. Both came from Java and are preserved in the British Museum. Females may have a small, horny protuberance, but they never seem to carry a proper horn.

The similarity between the Javan and the Indian rhinoceros probably accounts for the fact that the specific status of the former was only recognised during the first decades of the nineteenth century, even though the animal had, in course of the centuries, been mentioned by various writers. Marco Polo, for instance, gave an account of seeing a 'unicorn' in Sumatra, which must have been a Javan rhinoceros. Later, Jacob Bontius, a Dutchman who lived in Java from 1627 to 1631, wrote extensively on the warak, a one-horned rhinoceros, but as the Indian species had by then become well-known to European naturalists, nobody got excited, and it was simply assumed that it could be found not only in northern India, but in the Malay Archipelago as well. Thus J. A. de Mandelslo, who travelled through Persia to the East Indies, wrote in about 1639: 'The rhinoceros, which the Indians call Abadu, is not as common in Java as in Bengal and Patane.' One eighteenth-century scientist, Professor Petrus Camper of Groningen, had a strong suspicion that there might be two different species, and he mentioned this in a letter to Pallas, the famous zoologist, without, however, putting his findings into print. Another zoologist, Blainville, who heard of Camper's suggestions concerning differences between the rhinoceroses of India and Java, disagreed emphatically and declared that at best they could only be considered as varieties of one and the same species.

During the Napoleonic Wars, Holland's eastern possessions were for a time taken over by the British and put under the Governorship of Sir Stamford Raffles. Arriving in Buitenzorg, this great patron of the sciences met Dr Thomas Horsfield, an English physician who had settled there in 1803, in order to make a thorough study of the zoology and botany of Java. The two men became great friends and Raffles did everything in his power to further the investigations of this excellent naturalist. When a report came in that a young one-horned rhinoceros had been brought to the royal palace of Soerakarta, they both went to

have a look at it and immediately recognised it as differing from the Indian rhinoceros.

With respect to the lesser one-horned rhino's distribution, Horsfield remarked: 'It is not limited to a particular region or climate, but its range extends from the level of the ocean to the summit of mountains of considerable elevation. I noticed it at Tangung, near the confines of the Southern Ocean, in the districts of the native princes, and on the summit of the high peaks of the Priangang regions, but it prefers high situations. It is not generally distributed, but is tolerably numerous in circumscribed spots, distant from the dwellings of man, and covered with profuse vegetation. On the whole, it is more abundant in the western than in the eastern districts of the island.'

Meanwhile another one of Raffles' naturalist friends, William Marsden, who acted as the East India Company's secretary at Fort Marlborough in Benkulen, had industriously been collecting material for a *History of Sumatra*, in the second edition of which he wrote: 'The rhinoceros, both that with a single horn and the double-horned species, are natives of the woods. . . .' When Raffles joined Marsden in Benkulen in 1817, he was able to identify the Sumatran one-horned rhinoceros with the animal he and Horsfield had seen in Java, and he sent a skull to the Museum of the Royal College of Surgeons in London. About the same time, Cuvier received three specimens from Diard and Duvaucel, two French natural history collectors working for him. He provisionally labelled them *Rhinoceros sondaicus*, and Desmarest used this manuscript name in the technical description of the species, which he published in 1822. A few years later, when preparing the second edition of his *Règne Animale*, Cuvier changed this to *Rhinoceros javanicus*, a fact which was to cause considerable confusion for a long time to come, both names being used freely by various authors.

Desmarest gave Sumatra as the country of origin of the type specimen on which his description was based. Both Marsden and Raffles had, in fact, already reported the species from that island, and Sir William Jardine, in his volume on Pachyderms published in 1836, called it the 'One-horned Sumatran Rhinoceros'. Later, Alfred Russell Wallace, who spent eight years exploring the zoology of the Malay Archipelago

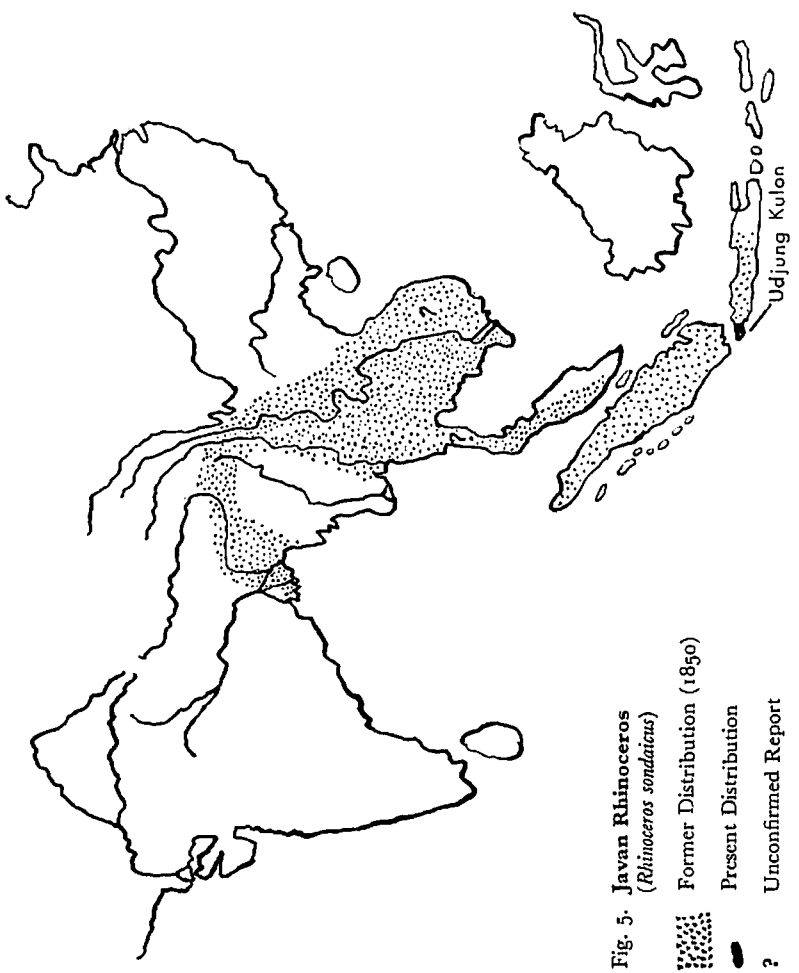


Fig. 5. **Javan Rhinoceros** (*Rhinoceros sondaicus*)

and wrote one of the very best books ever to be published on the area, brought some rhinoceros teeth to the Museum of the Royal College of Surgeons, with regard to which G. Busk wrote: 'Before concluding I would mention that Mr Wallace has been good enough to place in my hands two upper molars in the most beautiful and perfect condition, which he procured in Sumatra, but which present indubitably all the characters of the tooth in question of *Rhinoceros sondaicus*. That species, therefore, would seem to exist in Sumatra as well as in Java, but I am not aware that zoologists are acquainted with the fact.'

Some of them apparently were still not acquainted with the fact even in the nineteen-twenties, for when J. C. Hazewinkel, a Dutch big game hunter, published photographs of some one-horned rhinoceroses he had shot in Sumatra, he caused a regular uproar. At first there was talk of a completely new species having been discovered, and when somebody finally recognised the identity of the animals, they were supposed to have been found in a place where *Rhinoceros sondaicus* had no right to exist!

Somehow it has always been the fate of the Javan rhinoceros to be confused with the Sumatran and Indian species, a fact which may be said to have bedevilled the literature on the Asiatic rhinos for more than a century. On various occasions it was wrongly reported to occur in Borneo, while its actual presence in Burma and Indochina led to a fanciful extension of the Indian rhino's area of distribution to the Gulf of Tonkin, more than a thousand miles east of where those animals were actually to be found. A rather blurred photograph published a few years ago as evidence for the continued existence of the Javan rhinoceros in Malaya, was quite definitely proved to show an individual of the Sumatran species. A Javan rhinoceros shown in the Berlin Zoo sometimes in the last century was in actual fact an Indian one, while an Indian rhino which died in the zoo of Adelaide, Australia, was found to belong to the Javan species. It is thus possible that quite a number of Javan rhinoceroses have been on view in Europe and America as Indian rhino. We know that early in the last century a travelling menagerie touring England had a definite *Rhinoceros sondaicus*, which was transferred to the Liverpool Zoo in 1836. Another one lived in the

London Zoo from 1874 to 1885, while a young female brought to England in 1877 survived for only half a year. A menagerie in San Francisco acquired a Javan rhinoceros in 1897, and a female which had been in the private zoo of the King of Oudh for ten years finally found its way into the Calcutta Zoo, where it lived for another five years. There seem to be no records of the species ever having bred in captivity.

The former distribution of the lesser one-horned rhinoceros included a considerable part of Java and certain areas of Sumatra. On the Asiatic mainland its range was slightly more extensive than that of the Sumatran species, with which, however, it largely coincided. Around 1850 it could be found in Malaya, Burma, Siam, Indochina and possibly in southwestern China, in the Chittagong and Manipur areas, among the Lushai (or Mizo) Hills, in the valley of the Brahmaputra River and in the Sunderbans of the Ganges Delta. Blanford records Kinloch shooting 'an undoubted specimen in the Sikhim Terai'. Some authors doubt this statement, and it certainly seems strange that General Kinloch himself does not mention the species in his classic work on big game shooting.

The Javan rhinoceros seems to have been exterminated even faster than the Sumatran species. By 1892 it had become very rare in the Sunderbans, and Edmond de Poncins, the French explorer and big game hunter, found rhino only in one part of this amazing labyrinth of rivers, swamps, islands, and forests. When he started off on his investigations, he was not at all sure what species of rhinoceros he would find, and from the information he had been able to gather, he rather expected the Indian one. Day in, day out, he kept tracking his elusive quarry and finally became certain of the presence of three individuals. Possibly there was a fourth, but there certainly were not more than six. As time went on, he began to wonder if these really were greater one-horned rhino. 'In one place, where one of them had been laying down, I could faintly discern that the skin, where not rubbed and polished by the branches, was something like a mosaic, leaving on the mud a sort of network of little lines,' he writes, 'That was queer. Then I found a tree where a rhino had rubbed his head and cheeks. In a case like this

the marks start at the level of the head, held horizontally or raised, but some mud sticking on the bark, showed that he had lowered his head almost to the ground. That is generally evidence of an animal turning its head sidewise and trying to scratch itself over the nose. That could not happen if there was a horn, and a horn would make a mark on the bark of the tree, if the rubbing had taken place just behind it. But then he had rubbed both cheeks, one after the other, on both sides of the tree, and left no mark when, with his head very low, he passed his nose from one side to the other. And finally . . . I got a glimpse of a strange profile at a very short distance. For the first and, I am sorry to say, the last time in my life, I saw that long, grey, hornless head and everything was explained: these rhinos were *R. sondaicus*, they had no trophy worth having and shooting them was without excuse.'

De Poncins had plenty of evidence that poaching was rife in the Sunderbans, and we can safely assume that the rhino he spared were wiped out not long afterwards.

Thom, who, before the First World War, devoted so much time to tracking rhinos in various parts of Burma, never came across the Javan species. Very few Europeans seem to have encountered it, and all reliable records come from Tenasserim, the southernmost part of the country. It was there in 1920, in the Mergui District, that Theodore Hubback obtained for the British Museum the last specimen known to have been shot in Burma. Peacock, who investigated the distribution of the species while he was Deputy Conservator of Forests and Game Warden, began to wonder if the Javan rhinoceros had ever existed outside the Thaton, Salween and Mergui Forest Division of Lower Burma. In 1930 he spent ten days on an extensive search for this species in the forests of the Victoria Point sub-division and caught a fleeting glimpse of just one rhino. It could have been an immature *sondaicus*, but when the animal had disappeared, Peacock realised that there was just as much probability of it having been a *sumatrensis*.

About that same time four specimens were believed to exist in the Kahilu Game Reserve in the Thaton and Salween Forest Divisions. The assumption was based on a report made by F. Allsop, a Forest Officer, but when D'Arcy Wetherbe conducted a thorough survey of

the reserve, he came to the conclusion that it was simply another case of mistaken identity – all the rhino in Kahilu belonged to the Sumatran species.

In Malaya, *sondaicus* probably never occurred east of the main range running through the length of the peninsula, despite rumours of its having been seen in Pahang. The last definite record is of one being collected in Perak as a museum specimen in 1932.

While living near the border between Laos and Siam at the beginning of the century, Guy Chemineau was taken to a wallow by a native hunter to whom he had been able to render some service. Two one-horned rhinos were disporting themselves in the mud, and the men shot one of them. Chemineau makes it quite clear that the animals were already very rare in the area, for on all his many shooting trips he came across rhinoceros tracks only twice. They seem at that time to have been somewhat more numerous in the Annamite Chain, in the forests of Annam and in upper Laos, but even there they were already being rapidly exterminated by the forest-inhabiting Mois. According to Professor Bourret, not more than about thirty individuals were killed by Europeans in all Indochina between 1900 and 1932. There have been reports that both species were 'common' in the Mekong Valley during the mid-twenties and could be hunted not far from Saigon, but all such statements can probably be considered as fairly unreliable. Count Franz Josef Seefried, who shot tiger and gaur in South Vietnam around 1960, with Viet-Congs prowling around not far from his camp, was told that some rhinoceroses survived in the mountains extending across the border into Laos to the north of the Srépok River. The French hunter accompanying him had been there not long before, and the natives had given him the skull of an animal killed a couple of years earlier, minus the horn, naturally.

'So you yourself could not find any rhinos in the area?' the Count asked. 'I have seen none,' the Frenchman replied, 'but in these extensive and very inaccessible jungles there are sure to be rhinoceroses left. You would need the resistance and endurance of a native hunter to find them, for one has to sleep in swamps and to stick to the tracks day after day in order to catch up with them. The area is extremely vast,

and there are probably only very few individuals hidden away in the humid jungles.'

This seems to be the latest piece of information to have come out of Indochina, and it is given for what it may be worth. The French hunter apparently did not make it clear from what species the skull came, but the fact that he mentioned one horn as having been cut off by the natives, seems to indicate *Rhinoceros sondaicus*.

Summing up the results of his survey, Lee Talbot states that the Javan rhinoceroses have definitely become extinct in Bengal, Assam and southwestern China, while all reports of its continued existence in Burma, Malaya, Siam and Indochina lack confirmation. This then leaves us with Sumatra and Java.

Just before the Second World War H. J. V. Sody, the well-known Dutch mammologist, very carefully sifted all the available literature in order to map out the animal's former distribution in the two islands. As far as Sumatra is concerned, he found that at the end of the last century the species was by no means rare. In the late twenties Hazewinkel still found it common enough in the Palembang Residency – at Soekadana as well as along the Rivers Niroe and Wai Saka – to be able to shoot seven specimens in less than twelve months. It probably also occurred in the far north, in Atjeh, where one is supposed to have been killed near Lake Takengon, around 1925. Lee Talbot was told that the animal had become extinct in Sumatra at least twenty years ago, and on his visit to that island he could not find any evidence to the contrary.

Sody's compilation of data leaves no doubt as to the species once having been very numerous in the western parts of Java. There are no records at all from the eastern tip of the island, the easternmost specimen reported having come from Kedoe, West Ngawa and West Rembang. Thousands must have roamed through the Javanese forests, and, as the observant Horsfield already pointed out, they existed along the sea coast as well as on the highest mountains. On Mounts Tjerimau and Gedeh (Pangerango) rhino were found at about 3,000 metres (approximately 10,000 feet). Junghuhn, the German naturalist who, in 1853, published a very detailed account of the island of Java, even encountered them on the narrow rims of active volcanoes. In Burma

and Malaya, *Rhinoceros sondaicus* has generally been made out to have been less of a mountaineer than *Dicerorhinus sumatrensis*, but the observers who knew the lesser one-horned species in Java all commented on its climbing abilities. The animals inhabited both virgin and secondary forests, as well as somewhat more open areas with marshes, plenty of bush and bamboo, provided there was sufficient shadow in which to hold their daily siesta.

'Its retreats are discovered by deeply excavated passages which it forms along the declivities of mountains and hills,' Horsfield said, 'I found them occasionally of great depth and extent.' Such well-trodden paths seem to have been a striking feature in many parts of the country, and travellers could be fairly certain that, in following one of these trails, they would finally be led to a spring or a forest pool. Where a tree had fallen over a deeply washed-out path, the rhinos squeezed past underneath it, the underside of the trunk in due course acquiring a smoothly polished appearance. In dense undergrowth the paths took the form of low tunnels, along which a man could only advance bent almost double. The tracks were of great use to the people, who opened up the wilder district of the island, and many a Javanese road is said to follow an ancient rhino path!

From the middle of the nineteenth century onwards, with the Javanese population expanding at a tremendous rate, and the jungle areas steadily shrinking, the rhino decreased rapidly. Today the few surviving individuals are restricted to the Udjung Kulon (also spelled Oedjoeng Koelon) Reserve (117 square miles) situated on a peninsula at the western tip of Java. This sanctuary was created in 1921, and its administration has been continued by the Indonesian Government.

Within this area the world's last Javan rhinoceroses frequent the parts least accessible to man, the jungle-covered central plateau and the southern coast. They are extremely secretive, but in zig zagging through their habitat they leave such a maze of tracks that visitors trying to assess the number of animals present can very easily be led astray, arriving at a figure much higher than the real number. The footprints of an adult *Rhinoceros sondaicus*, incidentally, measure about eight and a half to nine inches in diameter, thus being only an inch or

two larger than those of a *sumatrensis*. The toes of the latter species are perhaps a little less splayed, but except for size, the tracks are almost identical, and in the case of immature animals, size will, of course, be of no use in identification. In Udjung Kulon the problem does not arise, as *sumatrensis* never occurred in Java, but in areas where formerly both species existed, it was very difficult, if not impossible, to distinguish them by their spoor.

When Lee Talbot visited this reserve, he noticed well-defined paths leading to wallows and drinking places. It can therefore be assumed that the animals are territorial inasmuch as they stick to certain localities and make a habit of visiting the same points at fairly regular intervals. But it has been established that their stamping grounds overlap a great deal. The wallows resemble those of the Sumatran rhinoceros, and Hoogerwerf, who got a splendid photograph of two bulls in course of wallowing, thinks that they do not use their feet for digging them, but simply enlarge pig wallows and natural hollows. What Junghuhn and other old-time naturalists had to say with regards to the mountaineering abilities of the Javan rhinoceros is borne out by the great agility the animals of Udjung Kulon display in climbing steep banks and scrambling over obstacles. They eat leaves, twigs and fruit, to get at which an individual will often push over a tree of up to six inches in diameter, by first leaning its shoulder against it and then walking over the trunk and forcing it down between the forelegs, exactly as has already been described for the Sumatran species. Talbot mentions the following food-plants: Tepus (*Nicolaia sp.*), young bamboos, *Donax arundinastrum*, *Ficus ssp.* He was told that rhino had been seen standing in the sea, apparently feeding on mangroves.

In course of his first survey of the reserve, the American wildlife expert was lucky enough, at various times, to get near to no less than six rhino, of four of which he had good views. He got the impression that their eyesight was very poor, for even at a distance of about five yards, they were not able to recognize him as a human being by sight alone. If an animal became aware of his presence from the downwind side, it snorted and made short dashes through the undergrowth in order to get his scent. Finally it turned and rushed away up-wind.

On one of his stalks, accompanied by A. Soekardi, the Director of the reserve and some Javanese helpers, Talbot met a cow with a calf, an encounter of which he gives a graphic description: 'We had been following their tracks when we caught sight of the baby disappearing into the jungle some yards ahead. The carriers and trackers promptly and prudently took to the trees, as they always did when we came to a rhino. Mr Soekardi and I pushed ahead and crawling around a clump of rattan, we unexpectedly came upon the little rhino at a distance of about five metres. It was chewing tepus, a favourite food of the rhino. Soon it lay down, first folding its hind legs and sitting with its front legs stiff, looking around. Then it folded its front legs also and laid its head down on the ground. This jungle is so dense that even at that range our view was not very clear, for although it was early afternoon, the jungle floor was very dark. Suddenly the mother rhino stepped from behind a rattan clump and stood beside the baby looking at us. She stared for a long time, blinking her black eyes, swinging her head, sniffing with flaring nostrils, and flicking her ears. We were down wind, exactly five metres from her tracks. She suddenly jumped back about two steps, turned and began calmly feeding. Shortly thereafter the baby got up and the two moved away.'

A wallowing rhino which Hoogerwerf approached ran away the moment it became aware of his presence. As the Dutch naturalist started taking measurements of the footprints, the animal came back and charged him. Hoogerwerf escaped and took cover behind a tree, whereupon the rhinoceros turned round and disappeared. On another occasion a rhino attacked a group of Hoogerwerf's porters and trampled on the luggage they had dropped while scattering hastily in all directions.

In former times, when the big beasts were still fairly common, encounters with them occasionally led to accidents. In his invaluable monograph Sody refers to a Dutch scientist's dangerous adventure, back in 1827. On an exploring trip through the Preanger Residency, van Raalte, the anatomist of the 'Natural History Committee of the Netherlands Indies', and his German colleague Dr Macklot, decided to spend a day hunting rhinoceroses. Trails were numerous, the party

soon split up, and van Raalte walked for about half an hour, followed by a dozen Javanese. A very fresh spoor then induced him to crawl into an especially dense patch of grass jungle, where he soon heard the animal blowing and puffing close by, without however being able to see anything. Suddenly the rhino was right on top of him, knocked him down before he could shoot, tossed him several times and bit him furiously about the legs. One of the Javanese, an old and experienced hunter, rushed to the rescue. His blunderbus burst when he fired off both barrels, but the bang scared the animal away, and the wounded man could be dragged clear of the high grass. The Javanese improvised a stretcher and carried him back to camp, where Macklot, who very fortunately happened to be a medical man, applied first aid. In addition to the severe bites on his legs, van Raalte had a broken rib and a bad wound on the abdomen, not to mention numerous bruises and contusions.

There are ten to twelve tigers in Udjung Kulon, and a calf losing contact with its mother might run some danger of being killed by one of them. But as a whole the big cats can hardly be considered as a hazard to the survival of the rhino, the 300 to 400 bantengs (*Bibos javanicus*) and the numerous Javan deer (*Rusa timorensis*), which frequent the more open parts of the reserve, providing them with all the prey they require. It is said that after the Second World War a gang of poachers entered the reserve in order to slaughter all the rhino for their horns. The men beat a hasty retreat after one of their number got himself killed by a tiger, and 'Stripes' may thus have been instrumental in giving the Javan rhinoceros another lease of life!

We now come to the burning question: How many rhinoceroses are there in Udjung Kulon? In 1959, when he published the report on his first survey, Lee Talbot assessed the population at between twenty-four and forty-five individuals. After a more recent visit – in September and October 1964 – he estimated it at fifty-six, giving his conclusions with regards to the present status of the species in the following words: 'In terms of total numbers, there is still a reasonable, if small, population within the reserve. However, the total lack of any evidence of young animals (except for one subsequent unconfirmed report from outside

the reserve) indicates a critical situation. During the past decade, six young rhino have been reported and about twice that many rhino killed or died. With reproduction, or at least replacement at this extremely low level, when the present animals are killed or die, the species will be gone. This situation could be caused by deficiencies in habitat or nutrition, or some social or other biological factor which affects breeding and reproduction; or by some other factor causing pre- or post-natal mortality. There would appear to be enough animals remaining which, judging from the tracks, frequently encounter one another, to provide opportunities for breeding at appropriate times. There is no obvious lack in the habitat or food supply. The only obvious factor at this point is poaching. Young animals are considerably more vulnerable and easy to approach than adults. . . . Only one baby has been reported poached in the past decade, but . . . it would appear possible that well directed poaching could account for many of the young in a small population of slow breeding rhino.'

It must be mentioned that some estimates are even lower than Talbot's, putting the number of rhino in Udjung Kulon at only ten to twenty individuals. We can but hope that those figures are below the true ones, for if they happened to be correct, the outlook for *Rhinoceros sondaicus* would be bleak indeed!

III *The Indian Rhinoceros*

The Indian rhinoceros, *Rhinoceros unicornis*, is much better known than the two other Asiatic species. For hundreds of years it was, to Europeans, the prototype of 'The rhinoceros'. When Conrad Gesner, town physician of Zürich, wrote his famous *Animal Book* in 1551, he knew no other species and as an illustration he included Dürer's woodcut of the specimen that had reached Lisbon in 1513, a gift of the King of Cambay in western India to King Manoel of Portugal. A few years later, Manoel decided to present the animal to Pope Leo X and entrusted Captain Juan de Pina with its transport. When the ship called at Marseilles, King Francis I, who happened to be in residence at that seaport,

heard of the rare creature and asked the Portuguese envoy to exhibit it to the townspeople. Juan de Pina complied with the royal wish, being rewarded with a present of 5,000 gold crowns. After it had been duly stared at, the rhinoceros was re-embarked, but it did not reach the Vatican alive. Soon after putting to sea, the ship was caught in a storm and wrecked not far from Genoa, going down with the loss of all hands. The carcass of the poor beast drifted ashore, where it was skinned and stuffed before being forwarded to Rome. Thus ended the first rhinoceros to have reached Europe since the fall of the Roman Empire!

Dürer's woodcut remained the only available representation of such an animal for a very long time, being copied not only in Gesner's *Animal Book* and in numerous other tomes dealing with natural history, but also on a bronze relief on the western portal of the Dome of Pisa, where it can be seen to this day.

More than 150 years years went by before another Indian rhinoceros reached Europe. It was put on show in the British Isles in 1685 and had its likeness drawn. Another one, a youngish animal, arrived in England in 1739. This specimen caught the attention of a Dr Parsons, who wrote a lengthy account of it. 'He was fed here with rice, sugar, and hay,' he said, 'of the first he ate seven pounds mixed with three of sugar every day, divided into three meals; and about a truss of hay in a week, besides greens of different kinds, which were often brought to him and of which he seemed fonder than of his dry victuals; and drank large quantities of water at a time, being then, it seems, two years old. He appeared very peaceable in his temper, suffering himself to be handled in any part of his body; but outrageous when struck or hungry, and pacified in either case only by victuals. In his outrage he jumps about and springs to an incredible height, driving head against the walls of the place with great fury and quickness, notwithstanding his lumpish aspect. . . . In height he did not exceed a young heifer, but was very broad and thick.' Parsons then went on to give a very detailed description of the rhino's appearance and of many of its anatomical peculiarities. He also provided his readers with a figure of the strange beast.

A few years later a rhinoceros achieved a considerable degree of

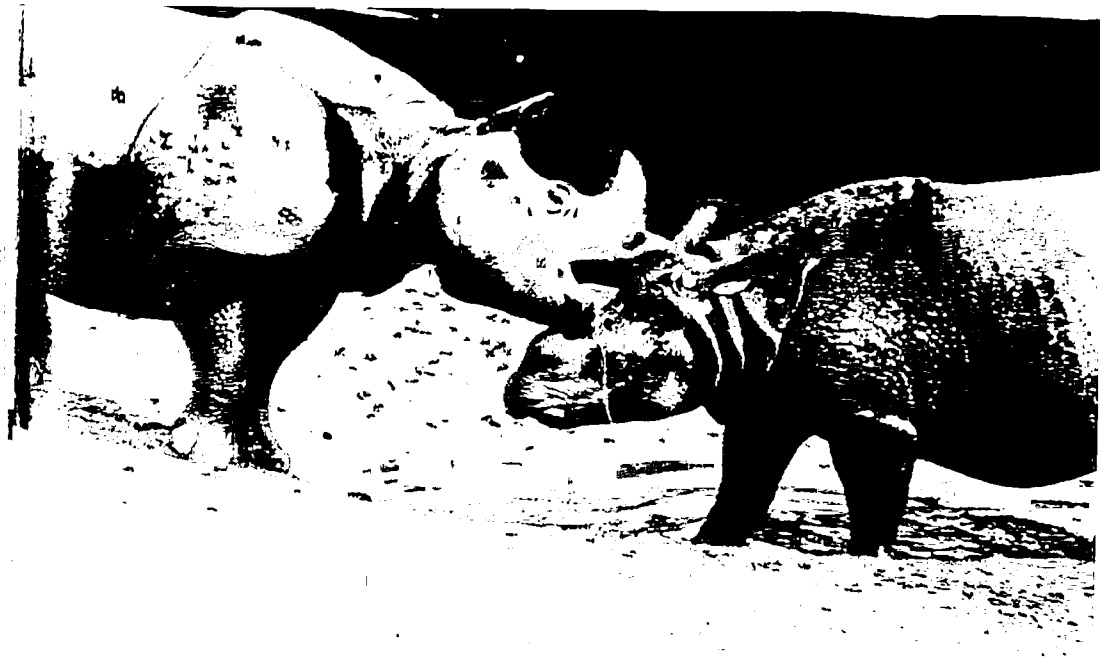
celebrity on the European Continent. It was brought to Holland by one Douvemont van der Meer, a sea captain from Leyden, who later had himself portrayed together with the animal. From the explanatory caption accompanying the picture, we learn that the rhino had been caught in the Empire of the Grand Moghul in 1741 and reached Europe when it was three years old. There is the additional piece of information that at the age of eight years it had a height of 5 feet 6 inches and a length of 12 feet.

Captain Douvemont van der Meer travelled all over Holland with his rhino, and the animal made itself very popular by publicly imbibing considerable quantities of wine and beer. In addition to these extravagances it is said to have consumed 60 lb. of hay, 20 lb. of bread and fourteen buckets of water a day. In order to keep it in good condition, the captain had its skin regularly rubbed with fish oil.

The rhinoceros drew not only the idly curious, but also the learned, for it is known that Petrus Camper, the anatomist and eighteenth-century rhino specialist, studied and modelled it, while Professor Albinus had an engraving of it made.

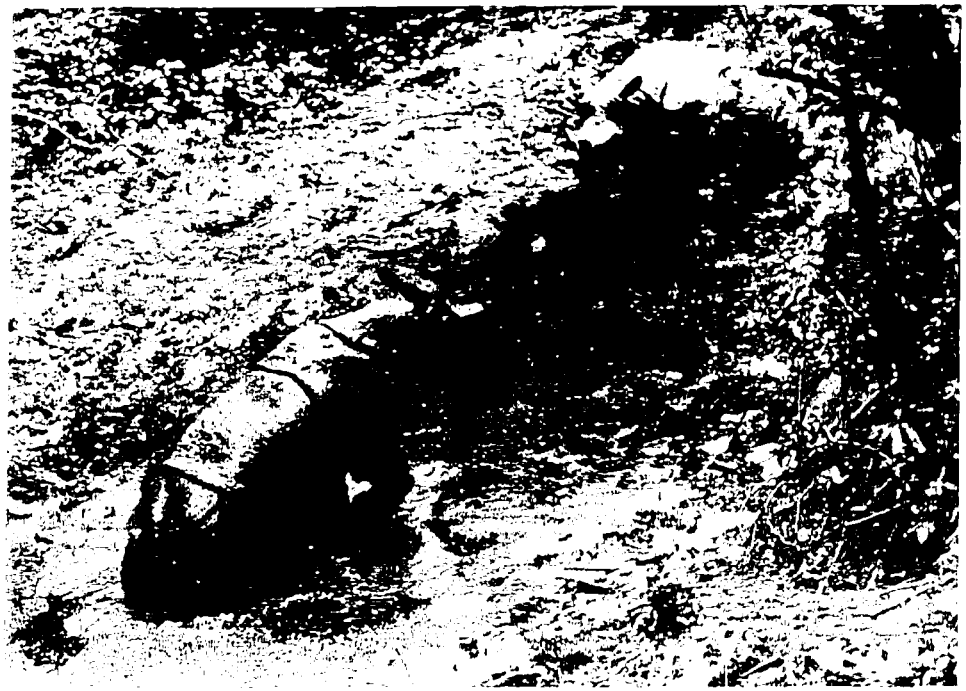
From Holland the rhinoceros was taken through most of Europe on a carriage drawn by twenty horses and in what almost amounted to a triumphant procession. It entered Vienna escorted by a guard of honour formed of Cuirassiers and it caused a tremendous sensation at the Leipzig Fair. The creature was visited by the erudite C. A. Bergen and had a poem written about itself by no less a writer than Christian Fürchtegott Gellert. Johann Elias Ridinger, a famous Augsburg artist, specialising in hunting scenes, had a good look at the armour-plated beast in 1748, immortalising it in an excellent print which was at long last to replace Dürer's woodcut.

The rhino's arrival in Paris was celebrated in epic verses and the whole population of the French capital turned out to see it. Ondry painted it, Charpentier engraved it, and even the notorious adventurer Casanova found it worth mentioning in his memoirs that he had seen the rhinoceros. When the celebrated animal was exhibited at the Fair of St Germain, the owner sold a pamphlet for 30 sols, which contained a portrait of it, together with an account written by Ladvocat, the librarian



Bull Indian rhino biting the cow. Basle Zoo.

Indian Rhinos courting. Basle Zoo.



Javan rhinos at a wallow in the Udjung Kulon reserve in Western Java.

Young female Sumatran rhinoceros in Basle Zoo.

of the Sorbonne, giving a summary of all that was known on the subject of rhinoceroses. Court fashions were *à la rhinocéros*, and Louis XV tried to buy the beast for the Versailles Menagerie. He had to desist when the owner demanded the tremendous sum of 100,000 crowns.

From Paris the rhinoceros went to Lyons and then on to Italy, while Louis had to content himself with a young specimen of the African species from the Cape of Good Hope. This entered the Versailles Menagerie in 1770, probably the first of its kind to reach Europe in modern times. This animal, incidentally, died in 1794, after having suffered a bad fall.

In 1751 an Indian rhinoceros was on show in Venice at carnival time. The masked revellers hastened to pay their respects to the ungainly stranger from the mysterious East, as can be seen in Pietro Longhi's well-known painting. From what I have been able to piece together, this animal must have been identical with the one which had been the rage of Germany, Austria and France a couple of years earlier and which we have last seen on its way to Italy. From Venice it went to Verona, where it was housed in the arena and had the distinction of featuring on a medal struck to celebrate the occasion.

In 1790, it was England's turn again, and an animal was brought from India and acquired by Pidcock as an addition to the Exeter Change Menagerie. 'His docility was equal to that of a tolerably tractable pig,' a contemporary report said, 'he would obey the order of his keeper to walk across the room and exhibit himself to the numerous spectators who came to visit him.' Like its continental predecessor, this rhino was something of a tippler, being 'remarkably fond of wine'. It is reputed sometimes to have consumed three or four bottles in a few hours. Under the circumstances it is, perhaps, not altogether surprising that after two years of a drunkard's life, the poor beast fell and dislocated its shoulder. It died after having lingered on for another nine months.

In 1799 Pidcock received another Indian rhino for export to Germany, but it died before it could be forwarded to its destination. A further specimen was exhibited at Exeter Change in 1810 and sold to the Continent four years later.

During the nineteenth century Indian rhinoceroses were on view in the zoological gardens and menageries of Europe and America much more frequently than African ones, and many of the animals lived for a long time. One was an inmate of the London Zoo for forty years. Another individual survived for thirty-six years in the Berlin Zoo. According to Blyth, the Zoological Gardens of Barrakpore in India had a pair which lived for forty-five years. No attempts seem to have been made to breed the species in captivity, zoo authorities probably taking the view that more specimens could fairly easily be got from the wild. It was not until 1925 that the Calcutta Zoo could report the birth of an Indian rhinoceros.

Even after the turn of the century, with *Rhinoceros unicornis* getting increasingly rare in its native haunts, some still found their way into zoos. Hagenbeck imported one from Nepal in 1929, and the Vincennes Zoo got a bull in 1933. Both were lucky enough to survive the Second World War, dying in 1955 and 1960 respectively. I distinctly remember that during the mid-thirties an Indian rhino could be seen in Regents Park and another one at Whipsnade.

In captivity, Indian rhino can become amazingly tame, and 'Joymothi', the famous female at the Basle Zoo, was on several occasions ridden by one of the keepers. She carried the man around the enclosure for up to ten minutes. Old Indian chronicles talk of rhino, with iron tridents fixed to their horns, being used as live 'tanks' in the front line of battle; while Timur, on conquering Delhi, is said to have been greeted by King Mohamed Nassir ed Din's twelve tame rhino, all respectfully lowering their heads. These stories may have a definite taste of *The Arabian Nights*, but we can also quote Colonel Pollock's account of one of these animals that served a 'dhoby', a professional washerman, by placidly carrying the washing around the town of Gowhatty. If this may appear to be a come-down from fighting in battles of ancient kings, or acting as a reception committee to a conqueror, it has at least the advantage of giving a true picture of the greater one-horned rhino's docility. If it had not been so hedged around with superstitions, this beast might perhaps have been domesticated liked the Indian elephant and the water buffalo!

The characteristics of the species have thus been familiar to Europeans for a long time. People were unfailingly impressed by its formidable iron-plated appearance. The tuberculated skin is divided into big shields by deep folds before and behind the shoulders, before the thighs, and on the hind quarters. The folds behind the shoulders and in front of the thighs continue across the back, but those in front of the shoulders run backwards, as has already been pointed out in comparing this species with the Javan rhinoceros. There are very deep folds around the neck, one flap of skin hanging down from the throat like a dewlap.

In former times the Indian rhino's body covering was likened to the suit of armour worn by a knight, while to present-day zoo visitors the animal recalls an armoured car or a tank. *Panzernashorn* – armoured rhinoceros – is the name commonly used in German. The shields and folds look so thick and indestructible that among the people of the West the beast was for a long time thought to be absolutely bullet-proof. As one writer put it: 'The hardest bullet, nay even an ingot of iron will not pierce it.' This belief was widely held even in the last century. During the Indian Mutiny a soldier had to face a court-martial for shooting a tame rhinoceros captured by his regiment. He did this, he explained, because he wanted to see if the animal really was as invulnerable as he had read!

In actual fact, the brownish or blackish grey skin is by no means as tough as it looks. Scratches very easily draw blood, and a hunting knife can be driven into the body of a freshly killed specimen with very little effort. Dried, the skin becomes very hard, and shields have often been made out of it.

As has been mentioned in an earlier chapter, the Indian rhinoceros closely rivals or even equals the white rhino of Africa as the third largest land animal. General Kinloch carefully measured an old bull and published the following figures: Height at withers, 5 feet 9 inches; length from nose to root of tail, 10 feet 6 inches; length of tail, 2 feet 3 inches; girth, 9 feet 8 inches. He pointed out, however, that larger individuals could be met with. Colonel Pollock, who did a considerable amount of rhino hunting in Assam, about a hundred years ago, gave the measurements of his biggest specimen as 6 feet 2 inches in height,

and 12½ feet in length. Several textbooks mention shoulder heights of 6 feet 4 inches, and 6 feet 6 inches, which would put *Rhinoceros unicornis* on an equal footing with *Ceratotherium simum.*

In 1959 both the bull and the cow of the Basle Zoo were put on a weigh-bridge and found to turn the scale at 2,070 kilos (4,554 lb.) and 1,608 kilos (3,538 lb.) respectively. About that time the bull stood 178 centimetres (5 feet 11 inches) and the cow 160 centimetres (5 feet 4 inches) at the shoulder. Maurice Burton states that the weight can reach 4 tons.

The head is much larger than that of the Javan species, and both sexes carry a well developed horn. Pollock's biggest rhinoceros had a fourteen-inch horn, while the record, preserved in the British Museum, measures twenty-four inches along the front curve. Horns exceeding a foot in length are definitely rare, and eight inches are thought to be a good average among the present-day population of the Kaziranga Sanctuary in Assam. The horn seems to be more firmly fixed than in the African representatives of the family; this, at least, was the opinion of P. B. van der Byl who, after plenty of hunting experience, both in Africa and Asia, wrote that he was never able to get one to peel off with the skin, as could so easily be done in the case of the African animals.

Rhinoceros unicornis once ranged over the whole of northern India, from Assam in the east to the Indus Valley in the west. Very fine representations of the species have come to light in the ancient city of Mohenjo Daro, which flourished more than 2,000 years before the beginning of our era in what is now the Land of Sind. Timur is known to have hunted rhino close to the Kashmiri border in 1398. Zahiruddin Mohamed Babur, the Moghul Emperor who ruled from 1505 to 1530 and left an excellent and amazingly reliable volume of memoirs full of interesting natural history observations, gave the following account of the rhino's distribution: 'There are numbers of them in the jungles of Peshawar and Hashnagar, as well as between the Rivers Sind and Bereh in the jungles. In Hindustan too they abound on the banks of the Saru (Gogra).'

A Turkish admiral, who travelled overland from Lahore to Constantinople in about 1556, also mentions encountering two rhinoceroses not far from Peshawar, and one wonders if at that time there still were some swampy areas in the ancient lake bed that forms part of the dry and dusty plain extending around that town.

Fossil and semi-fossil remains have been found in the Narbada Valley and near Madras, but in historical times the area of distribution does not appear to have reached much further south than the plains of the Ganges, to about 22° north latitude in the State of Bihar. Relentless hunting and loss of habitat through encroachments of a steadily increasing human population drove the rhino out of the western part of their range, and in the late eighties, when Blanford collected the material for his volume on mammals in the celebrated *Fauna of British India* series, they had become practically restricted to the Assam plains and were rare – if they did still exist – west of the Teesta River. Outside India proper, rhinos could at that time be found in some numbers in the Bhutan Duars as well as in the Nepal Terai, where they were considered as royal game by the rulers of that country.

Soon after the turn of the century, the British authorities became alarmed at the rapid decrease, and from 1910 onwards the hunting of rhinoceroses was prohibited in Bengal and Assam. About the same time a number of reserves were created in order to ensure the survival of the species, the first ones being Kaziranga and Manas. Others followed, but with the price of rhino horns rocketing to absurd heights, poachers were not to be easily deterred.

In Bengal it was E. O. Shebbeare, naturalist, forester and mountaineer, who pitted himself against the forces of ruthless destruction and save the rhino from complete extermination. The British forest service in India has produced a great number of remarkable men, and Shebbeare can be rated as one of the most remarkable of all. The Sanctuary of Jaldapara, where rhinoceroses occur even today, owes its existence almost entirely to his untiring efforts. Bengt Berg, one of the great pioneers of animal photography, wrote about this devoted conservationist: 'There, before him, were the plains of Bengal, teeming with 60 million people. They overflowed all borders and in their urge to expand they pressed forward and threatened the jungles with purposely

laid forest fires, the wild buffaloes with the diseases of their starving cattle, the rhinoceroses with anihilation! Behind him was the Bengal jungle, steaming in the tropical heat, the home of the tiger, the fever and the unicorn. Over the tops of the trees one could see the far-away virgin forests of forbidden Bhutan creeping up the blue slopes of the Himalayas, until they disappeared among the clouds billowing around the eternal snows. Here he was, ready to fight for the land behind him with the full power of his word and the strength of his hand .... Times had indeed changed. Formerly the strong man of the village had made it his business to protect the people from the dangerous animals of the jungle. And now? Here stood the strong man, and he was going to defend the wild animals against the humans.'

I have always considered these lines as about the highest tribute that can be paid to a man, especially in this overcrowded and, as a whole, so pompously hypocritical age of ours!

Shebbeare gave Bengt Berg permission to enter Jaldapara and to attempt getting photographs of the rhinoceroses, a thing nobody had yet undertaken systematically. In 1932 the Swedish naturalist therefore pitched his camp east of the Torsa River, concentrating his efforts on about seven and three-quarter square miles of jungle which he found to contain twenty to twenty-five of the last remaining thirty-five to forty rhino of Bengal. After several weeks' hard work he had got together a superb collection of flashlight pictures showing the huge beasts peacefully going about their business within the vastness of their elephant grass jungle. When he compared the various photographs, Bengt Berg found that one way to distinguish the animals from one another was by close scrutiny of the skin tubercles, the pattern of which varied noticeably in different individuals. Once he could recognise the rhinoceroses of the area, he became able to gather a considerable amount of interesting information with regards to their movements and habits.

In Assam, there was the same dogged fight to keep the poachers out of the reserves, and at one point the Assam Rifles had to be called in. The troops went into action as if they were dealing with a local insurrection. Kaziranga, first gazetted as a Forest Reserve, became a Game

Sanctuary in 1926. It was thought that the interests of the rhino could be best served by keeping the reserve rigorously closed, and even highly qualified people found it impossible to get permits to enter the area. This only resulted in the so-called sanctuary becoming a favourite stamping ground of the poachers. When a timely change of policy brought about the decision to clear up the place and make it accessible

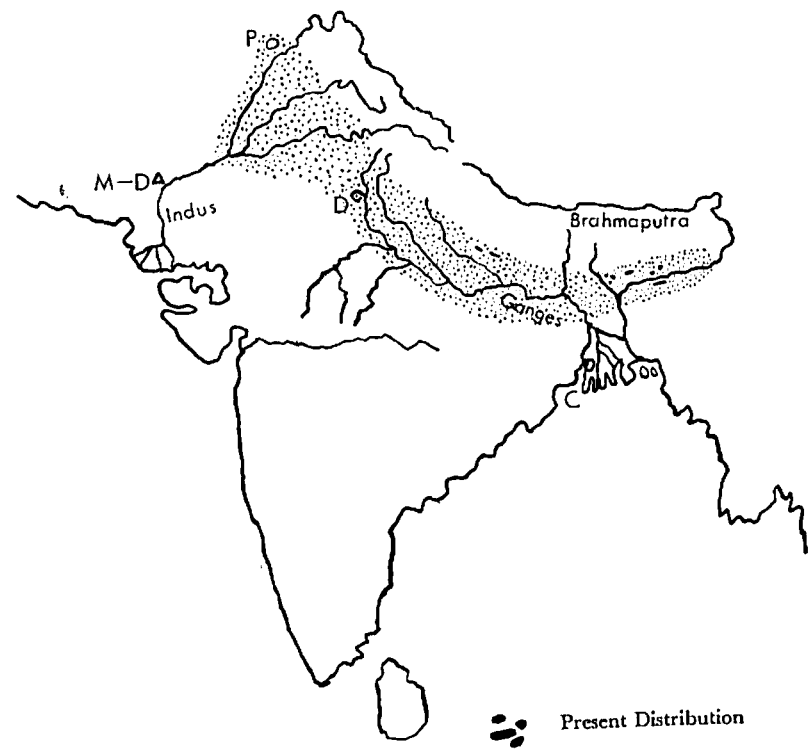


Fig. 6. **Indian Rhinoceros** (*Rhinoceros unicornis*)

Distribution at the Time of Babu (1520)

M—D Mohenjo Daro
P Peshawar
D Delhi
C Calcutta

to the public, forty rhino carcasses and numerous camp sites were found.

On the opening up of the Kaziranga Game Sanctuary in 1938 – the name has since been changed to Kaziranga Wild Life Sanctuary – one of the first to come and have a look at the rhino was an English tea planter, E. P. Gee who, having settled in Assam in the late twenties, had long ago fallen under the spell of India's wonderful array of animal life. Today, E. P. Gee is one of the foremost protectors of this much threatened fauna, and he has become the world's leading authority on the Indian rhinoceros. To him we owe a considerable amount of what we know about the habits of these fascinating animals.

In 1959, Gee assessed the figures of all rhinoceroses surviving in India as follows: State of Bihar, two; State of Bengal, forty-five in Jaldapara and three in Garu Mara; State of Assam, twenty-five in North Kannrup Sanctuary, 260 in Kaziranga, fifteen in Orang, five in Sona Rupa, twenty-five in the Laokh Reserve, and twenty outside the reserves. Thus there were forty-seven animals in Bengal and 350 in Assam. In a more recent publication – in 1964 – he gives the figures of sixty-five and 375 for Bengal and Assam respectively.

What about Nepal, where, according to C. H. Stockley, rhino were still plentiful in the twenties? It has been mentioned that in this country they were at one time considered as game beasts, the killing of which was entirely reserved to the ruler and his guests. The animals had added protection from the high incidence of malaria prevalent all over the Nepal Terai. But despite all this, their numbers diminished steadily, and they were gradually pushed back into an area of about 1,250 square miles, which included parts of the valleys of the Rivers Narayani, Rapti and Reu. In 1942, E. A. Smythies, a forest officer in the service of the Nepal Government, estimated that there were only three to four hundred of them left. They were at that time still under the fairly effective protection of the Royal family. After the political upheaval of 1951, agriculturists began to move into this last wild part of the Terai, poaching increased enormously, and protection ceased to exist, except on paper. In 1958 there were persistent rumours that a strong gang of Indian poachers had crossed the border and systematically

slaughtered all the remaining rhino. No less than 500 were said to have been killed, and the Survival Service Commission of the International Union for the Conservation of Nature (IUCN) became seriously worried. E. P. Gee was asked to visit Nepal and to make a study of the rhino population – provided there were any of the animals left to study. What Gee found was fortunately not quite as bad as he had been led to expect. He saw fifty-seven rhinos, of which twelve were calves, and in his report, which was published by the Fauna Preservation Society, he assessed the total number at about 320 to 400. At the same time he pointed out that the animals were under considerable pressure, both from poachers and through loss of habitat owing to a steady influx of agriculturists. Not much seems to have been done to relieve this pressure, for in his most informative and beautifully illustrated book *The Wild Life of India*, published in 1964, Gee estimates the number of rhino surviving in Nepal at no more than 185!

From Bengt Berg's classic photographs and from the numerous pictures and cinema films that have since come from the Kaziranga Sanctuary, one might be inclined to consider *Rhinoceros unicornis* as an animal partial to swamps and to dense grass jungles, through which it tunnels like a gigantic rodent. As a matter of fact, the Indian rhino is by no means restricted to flood plains and elephant grass, but will, if given a chance, roam through quite a wide range of habitats. It can be found in open grassland, in bush and savannah, as well as in hill country and in forests. During the cool months, from November to April, the rhino of Nepal used to live mainly in the forests and bushlands of the river valleys. In June, when the rains set in, many of them left the flooded plains and moved up into the grasslands, as well as into the sal-forests of the hills, where they stayed till about September. The animals are mainly grazers, and they occasionally raid rice fields, especially when the young shoots are beginning to grow.

The rhino Bengt Berg photographed in Jaldapara left the dense jungle in the cool of the evening, in order to feed on the fresh grass growing on stretches of land which had recently been burnt. They spent part of the night resting wherever they just happened to be and moved back towards their hiding places in the morning, grazing as they went

along. Some of them only disappeared in the high elephant grass a few hours after sunrise. They spent the sweltering afternoon hours in their wallows, the evening tracks being in consequence splattered and smeared with liquid mud.

When Kaziranga was first opened to visitors, the hitherto much persecuted rhinoceroses either took flight, or did their best to scare the intruders away. But they soon became tamer, and nowadays they can be watched as easily as the black rhino of Amboseli or the white rhino of Umfolozi. They spend a considerable time wallowing, remaining in their mud holes for most of the day during the hot weather. They are solitary creatures, but cannot be called strictly territorial, for one wallow may be used by quite a number of individuals. Gee once saw seven of them coming out of the same pool, running away in seven different directions. The enormous dung-heaps, which can measure up to fifteen feet across and up to four feet in height, are visited by all individuals which happen to pass them.

Ponderous and ungainly as *Rhinoceros unicornis* may look, it is nevertheless quite agile and manages to twist and turn surprisingly quickly. Disturbed, it will move off in a long, swinging trot and, if necessary, change over to a lumbering, though amazingly fast, gallop. Charges are rarely pressed home, the snorting and grunting beast usually stopping short of its objective, wheeling round and finally trotting away. Even though fatal accidents have happened, Blanford was undoubtedly right when he called it a quiet, inoffensive animal. Colonel Pollock was of the same opinion. 'As a rule, rhinoceroses are inoffensive,' he wrote. 'They do a good deal of damage to grain, if any is grown within a reasonable distance of their haunts, but generally they inhabit such remote localities that they can do no harm. It is naturally a timid animal, more anxious to escape than fight and it is by no means difficult to kill. Of course, when a rhinoceros has been severely wounded and is closely followed up, it will turn; but so will a rat, or, as they say, a worm.'

If an Indian rhino does charge in earnest, it uses its lower incisors as weapons of attack in preference to the horn, and with them it can inflict deep, clean cuts. Blanford was shown a straight, horizontal scar

on the leg of one of the Maharaja of Cooch Bihar's elephants. This was the mark of a wound caused by a rhino. From all accounts available, one gets the impression that the Indian elephant treats the rhinoceros with rather more respect than the African elephant usually displays. Before the Kaziranga rhino got used to being India's most famous wildlife show, elephants carrying visitors usually turned and fled as soon as one of the 'jungle tanks' came rushing at them, stampeding through the high grass for a mile or more and giving the tourists on their backs a thrill they were not likely to forget. In Nepal, the elephants used in the lavish royal hunts were terrified of rhinoceroses, and van der Byl tells us that he saw their lines reformed again and again before the gigantic game could be driven out to the guns in the open. Those same elephants would unhesitatingly have entered thick cover in order to stir up a tiger. So, once again, we are reminded of the 'great antipathy' Pliny wrote about.

When King Manoel's rhinoceros was the wonder of Lisbon, the presumed enmity between this fabulous creature and the elephant provided an inexhaustible topic of conversation and speculation. As the king also owned an Indian elephant, he decided to put the matter to the test. He had an enclosure constructed, in which the rhino was hidden behind a tapestry. The elephant having been brought in by its mahaut, the tapestry was withdrawn on a signal from Manoel. The rhino first approached its keeper, as if looking for protection, but when the men drove it towards the elephant, the latter quickly lost its head. Shaking off the mahaut, he broke out of the arena and ran straight back to its stable, trumpeting all the way and leaving the rhinoceros master of the battlefield. The occasional elephant can be trained to stand still in front of an attacking rhino and even to charge back at it, but many never lose their fear. Very little seems to be known about the relationship between rhinoceros and wild Indian elephants.

A nineteenth-century sportsman, quoted by Gee, went rhino hunting in the area which is now the Kaziranga Sanctuary. He wounded one of these animals late in the afternoon, and when he followed the blood spoor on the next day, he found it fighting off the attacks of two tigers. One of them had its neck fearfully lacerated, evidently by the rhino's

teeth, and the other one, too, was covered with blood. The hunter finished off the rhinoceros, but the badly mauled tigers escaped.

A tiger would, of course, be able to kill a calf if the mother were caught off guard, but this probably happens only very rarely. When making his survey of the rhino of Nepal, Gee, riding on an elephant, came upon a cow defending her newly-born baby against a tiger. The big cat slunk away into the high grass when he became aware of the approaching elephant, while the infuriated mother turned against what she took to be a new enemy and charged two or three times. In spite of the general commotion and the wildly gesticulating arms of the mahaut, Gee managed to snap several unusual pictures.

Indian rhino also use their incisors against each other in course of their mating encounters. To quote Colonel Pollock: 'They appear at certain seasons to fight amongst themselves, for I have killed both males and females scored all over.'

In 1932, Bengt Berg got an excellent daylight photograph of a bull chasing a cow through fairly open jungle, clouds of dust billowing around the two animals' legs. Such pursuits are now known to be an integral part of their mating behaviour and on one of my visits to Europe I was fortunate enough to see Gadadhar and Joymothi of the Basle Zoo indulging in their nuptial play. The animals tore round and round in their spacious enclosure, splashing through the water. Usually it was the bull who ran after the cow. But on occasion she turned the tables on him and chased him with great vigour. Sometimes they stood nose to nose, shoving backwards and forwards, and in doing so they crossed their horns in a way I have never yet observed in African rhino. On the other hand, there were none of the vicious prods and lunges at flank and belly which are so characteristic of similar fights among the African species. Several times Gadadhar and Joymothi bit each other, not very hard, it is true, but I can well imagine that quite a lot of damage may be done when things get really serious. While I was watching the bull kept pushing his head up against the cow's rump and back, exactly as I have described in the case of the black rhinoceros, and he made a few attempts at mounting her. She never stood still, however, and he always tumbled off after a few short moments.

There naturally are certain differences in the mating habits of *Rhinoceros unicornis* and *Diceros bicornis*. The black rhino does not bite its partner, not having any incisors, while the Indian rhinoceros seems to make much less use of its horn. But as far as I could judge, the antics of the two species are by no means very different.

The Basle Zoo has been extremely successful in breeding Indian rhinoceroses, and through the publications of Dr E. Lang, the Director, and Paul Steinemann, his Chief Assistant, we are now very well informed about their reproduction. The birth of a calf in the Calcutta Zoo in 1925, was somewhat premature, and the animal survived for only a few hours, while Rudra, the son of Gadadhar and Joymothi, born on 14th September, 1956 after a gestation period of 474 days, grew up into a big and healthy animal. On 17th August, 1958 the couple produced a daughter, Moola, who also developed in a most satisfactory manner. In this case the gestation period amounted to 487 days. Meanwhile, on 27th November, 1957, after a gestation period of 488 days, a calf had also been born at Whipsnade.

Previous to the birth of Rudra, E. Lang noticed that the cow came in season every thirty-six to fifty-eight days. There was always a lot of spraying, both animals ejecting their urine rhythmically. The bull was seen to smell the ground where the cow had sprayed. On 28th and 29th May, 1955, seventeen months before the calf was born, Joymothi came in season for the last time. Towards the end of July 1956 it was noticed that the otherwise extremely good-natured female had become unusually nervous, and on the day before the birth, she made several mock-attacks on her keeper.

The newly-born bull calf had a weight of 133·4 lb., stood 24·4 inches high, and had no horn at all. The dark, greyish-brown skin, rosy red in between the armour plating, was completely hairless except for the tail tuft, the fringe on the ears and two tiny tufts at the base of each ear. Having been born at 9.24 p.m., Rudra got to his feet at 10.34 p.m., only to topple back into the straw almost at once. At 10.46 p.m. he succeeded in getting up again and proceeded to nuzzle the head of his mother, bleating at short intervals. Thirty-nine minutes later Joymothi got up, the calf at once looked for the udder in the right place,

managed to grasp a teat and suckled audibly for a full twelve minutes. Replete and satisfied he then settled back in the straw.

During the first few months of his life Rudra must have consumed about 44 pints of milk a day. E. Lang tells us that the Indian rhino's milk is rather thin and has a sweetish taste. He had it analysed chemically, feeling that an accurate knowledge of its consistency might come in very useful in case a cow should refuse to suckle her calf.

When he was fourteen days old, Rudra playfully munched some leaves, but did not swallow them. The bull calf only began eating leaves and hay in earnest during the second month of his life. At the age of two weeks Rudra already galloped round the enclosure with his mother.

At first the little rhino's weight increased by 4·41 lb. daily. Later, when he was only being weighed once a month, the balance each time indicated an increase of 110·25 lb. and on his first birthday, Rudra had the respectable weight of 1367·10 lb.

Moola struggled to her sturdy little legs only seven minutes after she had been born. She lost her balance and fell, but when she was but twenty-four minutes old, she not only stood somewhat shakily, but soon afterwards made the first few tottering steps towards her mother in order to get at the udder. At the age of forty-five minutes she had her first meal. The cow calf was 25·2 inches high and weighed 147·75 lb. She turned out to be a precocious child, for she began butting her mother with her little head when she was three days old and ventured into the water basin on the fifth day, obviously assuming that she could simply walk across the shiny surface. When her feet dipped into the wet, cold element, Moola got a real shock. She retreated hastily and did not dare to go near the water again for quite some time.

On 31st August, 1962, Joymothi gave birth to her third child, a bull calf which was born after a gestation period of 479 days and weighed 149·94 lb. In 1963 zoo-born Moola, now five years old, produced a bull-calf, while her mother had her fourth baby – a female – a year later.

Does the young Indian rhinoceros follow in the wake of its mother or precede her? P. Steinemann has published a charming photograph of two-day-old Moola taking her very first walk outside the stable, and she can be seen sedately tripping along behind Joymothi. Bengt Berg

got several instructive night photographs showing a small calf following its mother. On another occasion, one of his automatic flashlight cameras caught the picture of a considerably larger calf. Where was its mother? Surely, if she had been ahead, she would herself have released the flash – so she was probably coming along behind the youngster. E. P. Gee, with his unrivalled experience of Kaziranga, points out that when a mother and calf are on the move, the young animal goes ahead in front with mother following, and he has photographs to prove this. But one of Gee's pictures, published in Philip Street's book *Vanishing Animals*, shows a small calf close behind its mother, almost underneath her tail.

Could it be that very young animals tend to keep back and to follow mother, whereas older ones precede her, as is the case with the white rhinoceros? There seems to be no account of Indian mothers making use of the horn in order to direct their offsprings. The Indian rhino's horn may, of course, be too short and slope too sharply backwards to serve such a purpose.

There are always plenty of calves to be seen in the Kaziranga Sanctuary, a sign that the population is vigorous and healthy. In Nepal, too, Gee saw a good number of young animals, and if the species could be accorded the same amount of effective protection it now has in Assam, it would most certainly be able to more than hold its own without any difficulty.

There are no oxpeckers in the countries inhabited by *Rhinoceros unicornis*, but their place is taken by the jungle mynah (*Aethiops fuscus*), a brown bird with a black head, a white patch at the base of the outer flight feathers, and a broadly rounded, white-tipped tail. Mynahs not only climb around on the rhino in the same way oxpeckers do, but they also give warning of approaching danger, and a rhino bolts very quickly when its companions fly up in alarm. Among the swamps of Assam, the animals are almost always attended by cattle egrets, but this does not seem to be the case in Nepal.

Gee has heard Indian rhinos make four different kinds of noise: a roar or bellow, when an animal is being captured, a snort of alarm, a grunt, and a whistling sound at the time of courting and mating. In his opinion this whistling sound is produced by the cow, and it has in fact

been heard from Joymothi. When the two rhino in the Basle Zoo had one of their nuptial chasing bouts, she sometimes seemed to whistle with every breath. As far as the senses are concerned, the eyesight can only be described as poor, as in all other members of the family, while the sense of smell is very acute.

Bengt Berg wrote in 1932: 'Many more people are out to slaughter the gigantic beasts than there are beasts to be slain. Their armour does not protect them. Extinction is approaching rapidly. In another hundred years their stuffed mummies will stand in the museums of the world, next to the skeletons of the *tyranosaurus* and the *titanotherium*, and in their guide books the visitors will read about the armour-clad beasts which used to inhabit the fevery jungles of India. Should a copy of my book still survive by then, sportsmen and zoologists will look at the pictures and smile about the poor photographer's primitive equipment. But they will also feel a pang of envy. Lucky chap! – They will say – to have lived at a time when there were such animals to be stalked with a camera! This is exactly what I myself have always thought of the hunters who, thousands of years ago, painted pictures of mammoths and ice-age rhinoceroses on the walls of their caves.'

Thirty-three years – a third of a century – have gone by since the Swedish naturalist-photographer penned these words which will ring loudly in the heart of every lover of wildlife. Some few armour-plated rhinoceroses are still stamping through the jungles of Bengal, Assam and Nepal, thanks to E. O. Shebbeare, P. E. Gee and to Bengt Berg himself, whose writings first drew world-wide attention to the plight of *Rhinoceros unicornis*. Is it too much to hope for an all-out international effort to make these last representatives of their kind really secure, so that future generations will be able to see the mighty unicorn not only in museums, but also alive in its eastern homeland? Or will the animal-lovers of ages to come curse us for having let these wonderful creatures follow the woolly-haired rhinoceros into oblivion?

6 Rhinoceros and Man

Professor Carl Thunberg of Uppsala approached his massive working table where, between plant presses, drawings, piles of leather-bound volumes and a whole array of bottles and flasks of all colours and sizes, there stood several blackish, beaker-shaped objects, which looked as if they had been carved from a horny substance. The Professor drew forward one of these vessels and examined it with interest. He then reached for a flask and poured some liquid into the strange goblet. Next the scientist let his hand hover over the many small containers, as if undecided which one to choose. When he finally picked one up, he read the faded and stained label, uncorked it, and passed its open mouth under his nose, before adding a few drops of its contents to the liquid in the vessel. He bent forward, his eyes fixed on the goblet, apparently waiting for something to happen. The expected reaction did not seem to occur. After a while the Professor shook his head, walked over to the sink and emptied the vessel. He repeated the procedure without losing any time, using some drops out of another of his many little glass bottles – but with the same negative result.

After a few hours' work, Carl Thunberg stepped to a writing desk, sharpened a goose quill and wrote: 'The horns of the rhinoceros were kept by some people in town and country, not only as rarities, but as useful in diseases, and for the purpose of detecting poison. As to the former of these intentions, the fine shavings of the horns, taken internally, were supposed to cure convulsions and spasms in children. With respect to the latter, it was generally believed that goblets made of these

horns in a turner's lathe, would discover a poisonous draught that was put into them by making the liquor ferment till it ran quite out of the goblet. Such horns as were taken from a rhinoceros calf were said to be the best, and the most to be depended on. Such goblets are frequently set in gold and silver and are regarded as suitable presents to kings, persons of distinction or particular friends; or else they are sold at a high price, sometimes at the rate of fifty-six dollars a goblet. When I tried these horns, both wrought and unwrought – both old and young horns – with several sorts of poisons – weak as well as strong – I observed not the least motion of effervescence; and when a solution of corrosive sublimate, or other similar substance, was poured into one of these horns, there arose only a few bubbles, produced by the air which had been enclosed in the pores of the horn, and which was now disengaged from it. Besides the use of its horns for goblets and handles of swords and daggers, there is scarcely any part of the animal which is not employed medicinally in the countries it inhabits.'

Carl Thunberg, like his friend and colleague Andrew Sparrman, had chosen South Africa as a field for his natural history explorations, and he was to go down in history as the 'Father of Cape Botany'. As most other eighteenth-century scientists, he had a wide range of interests and was fascinated by problems of the most diverse kind. He knew the African rhinoceros in its native haunts, and in Cape Town, the halfway-house between East and West, he was well placed to learn something of the strange beliefs attached to these animals. Some of the superstitions he recorded had actually reached Europe many hundred years before and were still firmly accepted by most people. It needed a man like Thunberg, a born scientist, always striving after the truth and not satisfied with what he was told from mere hearsay, to put one of these beliefs to the test and to prove it utterly false!

We shall never know what our ice-age ancestors thought of the woolly rhinoceros. Was it, to them, just an abundant source of meat, provided they could trap one in a cleverly hidden pit, or did they consider it as a creature full of magical properties? Was any special significance attached to certain parts of its carcass? The Cro-Magnon people, who left us those magnificent cave paintings, very probably had elaborate cults

connected with the animals they hunted. And the Shamans may well have accorded such an imposing beast as the rhinoceros a more than ordinary part in their world of animistic make-belief. However, be that as it may, we can be absolutely certain that many of the superstitions concerning rhino, which in eastern countries are widely believed even today, originated thousands of years ago and probably had their roots in prehistoric times. In the fourth century BC there lived a Greek, Ctesias by name, whose knowledge of medical matters secured him the position of court physician with Queen Parysatis of Persia and later with her son, Artaxerxes II. Being of an enquiring mind, Ctesias gathered an enormous amount of miscellaneous information and is reputed to have written no fewer than twenty-three books. One of the most popular of his works dealt with India, and it was destined to become a fountainhead into which many later writers and historians dipped very freely. They did not realise that Ctesias was a rather gullible person, who could not distinguish the true from the fabulous and therefore cheerfully populated far-away India with worms seven cubits long, which habitually fed on oxen and camels, as well as with 'Sciapodes' or 'Shady-feet' people who had such enormous feet that they lay on their backs and used them as sunshades. He reported Indian princes as going to war with 100,000 elephants, of which 3,000 specially chosen ones were used only to demolish fortifications, and he also mentioned a beast called the 'Indian Ass', which carried a horn in the middle of its forehead. A drinking cup made from one of these horns was a very useful thing to possess, Ctesias said, for it had the property of detecting poison.

There can be no doubt about the 'Indian Ass' with its miraculous horn being the first reference to the rhinoceros by a western author. Ctesias himself never visited India and certainly had no opportunity of seeing one of these animals. Many of his informants may have been speaking from hearsay, others probably drew largely on their imagination. How would even a modern naturalist describe a beast he had never seen and of which there are no pictures, basing his account merely on some vague and contradictory rumours? In what he wrote about the 'Indian Ass', Ctesias may even have got several animals mixed up together, producing something of a chimaera which, in addition to the

frontal horn, was supposed to have cloven hooves, a horse's mane, a dark red head, a white body and a boar's tail, but of which the rhinoceros was the main component. The pen-portrait of an animal drawn by somebody who believed in the existence of the 'Sciapodes' and camel-eating worms, should, of course, not be taken too literally. But that is exactly what future generations were to do, and this first and very fanciful description of the rhinoceros crept into the works of many authors who should have known better.

Aristotle was very puzzled by it, but he never had an opportunity to check the stories told by Ctesias. Pondering over the book dealing with India, he came to the conclusion that there had to be two one-horned animals, the actual 'Indian Ass', which would have one hoof, like all donkeys Aristotle had ever seen, and the 'Oryx' with two. The Sage of Stagira obviously nursed a very shrewd suspicion that Ctesias had got his animals somewhat muddled, but he took the 'ass' too seriously. For the cloven hoofs, mentioned in Ctesias' description, he picked on the Arabian oryx, of which some vague reports had reached him, assuming that this beast, too, had but one horn. Had Aristotle joined the Indian expedition of his former pupil, Alexander the Great, the unicorn story might have taken a very different course, for participants in this adventurous campaign must have become quite well acquainted with the 'Indian Ass' of Ctesias, even if they never came across the 'Sciapodes'. It was only during the reign of Ptolemy Philometor that Agatharchides of Alexandria, in summarising the Greek discoveries in the Erythrean Sea, as the Indian Ocean was then called, gave a recognisable description of the rhinoceros. He may well have been the first author to write from personal experience, for the Ptolemies kept big menageries, and it is known that Philometor once paraded a rhinoceros through his capital, together with a whole host of other animals.

Meanwhile, the Romans had embarked on their imperial career, which led to a considerable extension of the known world. Of the various surviving records dealing with Roman explorations, one of the most fascinating concerns a diplomatic mission which the Governor of Tunis sent to Garama, the present-day town of Jerma, where the King of the Garamantes held court. The legation was led by one Julius Maternus,

an officer who found it good policy to join the Garamantes in a military expedition against their southern neighbours, the 'Aethiopians'. He thus became the first European to cross the Sahara and to reach the Sudanese steppes somewhere near Lake Chad. In his report of the campaign he mentioned a place called Agisymba, explaining that this meant 'where the rhinoceroses foregather', probably a waterhole visited by a great number of these animals, as some pools in the dry and arid parts of Kenya are even today. We can imagine the Roman watching with amazement, as the huge creatures, squealing and puffing, chased each other around in the strong light of the desert moon. There appears to be some uncertainty about the exact date of Julius Maternus' great adventure, but it is possible that by that time the inhabitants of Rome had already had a chance to see a rhinoceros, for one is said to have been brought back from Africa by Pompey the Great (106–48 BC). Another rhinoceros was put on view in the triumph Augustus arranged in 29 BC to celebrate the conquest of Cleopatra's Egypt.

From then on beasts of this kind appeared at fairly frequent intervals in menageries and circus games. Marcus Valerius Martial, the poet who lived from AD 40 to AD 100, tells us, that in the arena the rhinoceroses were the most terrible fighters of all the animals, lifting bears right off the ground on their horns. Deeply impressed by such performances, Oppian was carried away into stating that a rhino's horn was hard enough to pierce brass and the most solid of rocks. All rhinoceroses were males, he went on, for nobody had ever seen a female specimen. They could therefore not be born in the normal way and probably came out of the rock. Another titbit of Oppian's rhinoceros lore consisted of the information that these animals carried golden hair on their foreheads.

There came the chaotic conditions following the final collapse of the Roman Empire and later the rapid spread of Islam from its cradle in the Arabian deserts, which very effectively cut off re-emergent Europe both from the East and from direct access to Africa south of the Sahara. Whatever knowledge the Greeks and Romans had accumulated with respect to the animals occurring in these lands, became a dim and distorted memory. The descriptions Pliny, Oppian, Aelian and others had given of the rhinoceros could still be consulted, but they were all strongly tainted by

Ctesias, and the animal which had been such a familiar sight in Roman arenas, changed its shape to the 'Unicorn', a horse with a long, flowing mane and a horn in the middle of the forehead. What kind of a horn would such a creature be carrying? It had to be something spectacular – and truly spectacular horns began at that time to turn up in Europe, nine feet or more in length, and twisted in a highly ornamental, clockwise spiral. Surely, those must be the horns of the fabulous 'monoceros' – and as such they were used in innumerable artistic and heraldic representations. Those horns did, of course, not come from the mysterious East, or from the burning deserts of Africa, but from the far north, and they were in reality the tusks of the narwhal. Thus was created another composite creature, no less strange than the 'Indian Ass' of Ctesias.

Many a learned and well documented essay has been written, speculating on how the unicorn of European legend came into being. One author tried to prove its derivation from – of all things – a snake, the horned viper of eastern lands. Others discovered a ready-made 'unicorn' on the monumental Gate of Ishtar at Babylon, which was excavated and restored by Professor Koldeway at the beginning of our century. This is probably the same creature which, under the name of *Re'em*, makes a few nebulous appearances in the Hebrew version of the Old Testament. The word 'Re'em', incidentally, has been translated as 'monoceros' in the Septaginta and as 'unicornus' in the Vulgata.

There have been suggestions that the unicorn of Babylon is in actual fact an auerochs, depicted in profile with only one horn showing. This may well be so, but nobody seems to have considered the alternative of its being an exact parallel to the European unicorn, an even earlier attempt by an artist to represent the Indian rhinoceros of which vague reports had come to him, but which neither he nor any of his contemporaries had ever seen. An echo of the rhinoceros is perhaps also to be detected in another monster striding across the brick walls of the Gate of Ishtar, the Sirrush or Babylonian dragon, which has in all seriousness been regarded as a dinosaur. It looks obvious to me that in the case of the 'Sirrush' we are dealing with the brain-child of an artist who let his imagination run riot – as artists will sometimes do even today.

It has often been said that the miraculous attributes of the legendary

unicorn later came to be transferred to the rhinoceroses. What really happened must surely have been the exact opposite: the superstitions woven around the one-horned rhinoceros of the East were added to the image the Western world constructed on the basis of the not very accurate descriptions the Greeks and Romans had given of the real 'monoceros'. We know that at the time when Ctesias resided at the Persian court, rhino horn was supposed to be useful for detecting poison. This was around 400 BC, and we can safely assume that the belief goes back even very much farther. Goblets of more or less the same kind as those Thunberg tested in the eighteenth century may well have been on sale in Mohenjo Daro and Harappa, the two emporiums of the ancient Indus Valley civilisation. It is not by accident that we find the same properties attributed to the horn of the medieval unicorn, even if that horn was borrowed from the narwhal of the northern seas and grafted on to a creature looking like a horse. The unicorn, so the beastiaries said, always preceded the other animals to the drinking places, dipping its horn into the pool in order to make sure that the water had not been poisoned!

The Christian world did, however, add its own quota of marvels to the saga of the unicorn. Because of its presumed invincibility in battle, to which Martial, Oppian and others had testified, the church very early began to make allegorical use of it. There originated a charming tale that it could only be overpowered if first induced to put its head into the lap of a virgin, and in due course the unicorn came to stand for chastity itself. In representations of the Annunciation it sometimes took the place of the angel, and finally it even symbolised the Holy Spirit!

Unicorn's horn – or Alicorn, as it was called – played a very important part in European medical history. Even though there were early doubts about its effectiveness – Conrad Gesner himself was not too sure about it and only prescribed alicorn when the patient insisted upon this drug – it enjoyed, for hundreds of years, a very high reputation as a regular cure-all, and the narwhal tusk became practically the symbol of the apothecary's trade. In England, alicorn was last mentioned as an officially recognised drug in a list published in 1741, but the unicorn, its mane streaming in the wind, can still be met with as the trade-mark

of Burroughs Wellcome & Co. one of the world's leading pharmaceutical firms. While alicorn was usually identical with the narwhal tusk, fossil elephant tusks and rhinoceros horns went under that name as well.

In 1590, Pope Gregory XIV was presented with the horn of an Indian rhino which, even though it differed from the approved horn of the unicorn, was obviously regarded as the real article. When the Pope, already ailing at the time he received the gift, was on his death bed, the tip of the horn was cut off, ground to powder and administered to him, though without bringing about the hoped-for recovery. This horn, with its decorative leather sheath, was sold by auction in 1909 and finally found its way into the American Museum of Natural History.

The mythical unicorn died a very slow death, for it had somehow detached itself completely from the animal it was supposed to represent, leading a ghostly life of its own. It continued to prance about not only on innumerable heraldic designs and on boards hanging outside apothecaries' shops, but also in the minds of a good many people who were convinced that it was only a matter of time until an explorer would bring back definite news of its existence from a remote desert or some fever-ridden jungle. Even during the last century there were rumours of its having been seen in the interior of South Africa and on the Tibetan Highlands. Travellers and naturalists discussed it as seriously as the Yeti has been discussed in our own days – and all they had to do was to go to the nearest zoo and look at the Indian rhinoceros. There was the real unicorn, the creature Ctesias had called the 'Indian Ass', the animal of which Thunberg had said, that there was scarcely any part of its body the inhabitants of eastern lands did not employ medically!

If a rhinoceros is killed in the Nepal Terai, in the jungles of Burma, Indochina, or Siam, in the forests of Malaya, Sumatra, or Borneo, very little of the carcass is left to rot. Bullet holes are plugged, so that the blood cannot flow out. The blood is then collected, for in certain areas rhino blood is supposed to facilitate the departure of the soul of a dying person and to ensure its happy arrival at whatever place it may be bound for. Before the last war, a pound of brown paper soaked with rhino's blood fetched as much as five shillings. The hunters extricate the bladder and take great care not to spill any of the urine, which is

considered as an antiseptic and also serves as a general charm against disease, ghosts and evil spirits. For this purpose it has to be placed in a vessel and hung over the door. The rhinoceros keeper of the Calcutta Zoo is said to be very eager not to let the urine of his charges go to waste as there is always a brisk demand for this fluid. The hide, some bones, the intestines, and the stomach contents all have their place in eastern pharmacopoeas.

If the carcass contains an embryo, there is great rejoicing among the hunters, for a rhino foetus is especially valued in medical practice.

The great prize is, of course, the horn, which has been thought to have the power of detecting poison for thousands of years. This must have made a rhino horn goblet an extremely precious object for whole dynasties of oriental potentates! It has already been shown that the story was also widely credited in Europe until science proved it to be fallacious. In Asia the belief still survives, but in this respect rhino horn has lost a lot of its former importance, the part poison used to play in the noble game of politics having been taken by the sub-machine gun and the hand grenade.

A rhino's horn is supposed to ease childbirth if placed under the woman's bed, and Gee reports that persons owning one of these miracle-working objects rent it out to expectant mothers for a sum equivalent of about £30 a time. Water, in which a horn has been thoroughly soaked, is presumed to turn into an elixir of life, to be sipped a spoonful at a time each day. The superstition that has done more harm to the rhinoceros family than all others is undoubtedly the Chinese belief in the powerful aphrodisiac properties of the horns. Through the centuries untold generations of aged gentlemen have been imbibing powdered rhino horn in some appropriate drink, hoping to feel like a twenty-year-old when next entering the harem!

Around the middle of the eighteenth century Thunberg destroyed the trust in rhino horns as a poison detector. It took very much longer to ascertain whether the properties ascribed to them by the Chinese were really based on fact. Considering the well-known origin of these nasal processes as mere excrescences of the skin, it has been confidently assumed for a considerable time that the elderly gentlemen mentioned

above might just as well have swallowed their own hairs or part of their finger- and toe-nails, for all the benefits to their virility they derived from rhino horn powder. But assumption is not scientific proof, and only quite recently have methods been developed which allow exhaustive tests into the biochemical and hormonal properties of any kind of substance. Such tests have now been carried out on rhino horn by several chemical laboratories, and it can definitely be stated that all of them have turned out completely negative. Science has given the final verdict, and we know once and for all that thousands and thousands of rhinoceroses have been butchered in order to pander to a stupid superstition!

The black market in horn for alleged aphrodisiac manufacture is, of course, the main reason for the precarious position in which the rhino family finds itself today. Some idea of the extent of the slaughter may be gathered from the fact that in the seventeenth century Siam exported up to one thousand rhino horns a year. In the eighteenth century the figure dropped to an average of 500 a year, and in 1830 only 60 horns and 100 skins left the country.

In the *New History of the T'ang Dynasty* (618–906), it is stated that 'Java produces tortoise shells, gold and silver, rhinoceros-horns and ivory'. Sumatra and Malaya are mentioned in the same work as further countries exporting rhino horn. Travellers who visited Java in the seventeenth century reported the horns being in great demand, and in the nineteenth century Chinese and Arab traders living on the island paid ten to twenty guilders per horn, and were ready to give up to fifty guilders for an especially good specimen. In the nineties the price had risen to anything from forty to 150 guilders. In Sumatra, Carl Bock, the explorer and natural history collector, had a horn offered to him at the price of eighty guilders.

Between the two World Wars the Chinese in Malaya bought horns at £2 and more per ounce, while their value on the Calcutta market at that time was literally about half their weight in gold. One single horn brought in by a poacher is known to have fetched £150. No wonder, that the last surviving rhinos everywhere were caught in pits, speared, shot at with muzzle-loaders and modern high-velocity rifles, and that gangs of poachers penetrated into their most remote strongholds.

'In Northern Pahang,' Hubback wrote, 'the largest of the Federated Malay States and the least developed, a tremendous amount of destruction was done to the rhinoceros population at the beginning of the century, despite the fact that from 1896 there was a law in Pahang, making it a punishable offence for any person who was not licensed so to do, to capture, kill or wound any rhinoceros. Not that anyone was either licensed or punished. These poachers were not hampered in any way by an enforcement of the law, and the inertness of the government must be considered as a contributory cause for the disappearance of the rhinoceros. Many years ago, I had the following conversation with an old Malay on the disappearance of the rhinoceros from much of the country where we were at the time. I had been for some weeks trying to locate rhinoceroses, but without success. "What," I said, "has become of all the rhino?" – "I do not know," he answered – "Do you remember if there were many here during your youth, because there must have been many at some time or other, according to the number of game trails I have seen which were obviously made by rhinoceroses?" – "Yes, there were very many when I was a boy. I remember a man, who devoted all his time to catching rhino in pits, coming here with a sack full of rhino's horns. I have not seen a rhino horn now for years, nor do I know where all the animals can have gone to!" – I had my answer.'

This sums up the situation all over Southern Asia, from the Sunderbans to the Mekong Valley, and from Nepal to Sarawak!

As long as there was a fairly plentiful supply of Asiatic horns, the Chinese buyers were not much interested in those coming from Africa. This attitude changed with the rapid extermination of the Javan, Sumatran and Indian rhinoceroses throughout most of their area of distribution, and African horns became a very desirable substitute. Up to that time, the horns of the two African species had mainly served for the carving of drinking cups, snuff boxes, handles for knives, swords and war-axes, no superstitious significance whatever being attached to them by any of the indigenous people of Africa. In certain areas shields and whips were made from the skin, but as a whole, killing rhinoceroses could not be called an especially lucrative occupation, and professional

hunters, white and native, concentrated their efforts on the ivory-carrying elephant. The near-extermination of the southern white rhinoceros was mainly due to the ridiculous ease with which the animals could be killed. Their meat was probably valued higher than their horns. Their rapid decline in Mashonaland and Matebeleland towards the end of the last century may, however, have had something to do with the increasing demands for African rhino horns from the Far East.

Rhino did eventually get more protection, but the Far-Eastern demand rose to a point where unscrupulous traders found it worth their while to send out whole armies of poachers in order to fill their warehouses with horns. I have outlined the tremendous reduction in the numbers of the once common black rhinoceros that has taken place since the beginning of the century, and it cannot be stressed too emphatically that these animals have not been killed to feed starving African tribes, nor have they stood in the way of progress and civilisation. They did not even provide *Homo sapiens* with some primary substance he cannot do without, like those other long-suffering mammals, the whales. Not one of the usual vague and more or less hypocritical excuses so often brought forward in order to justify wholesale slaughter fits the case of the rhinoceroses. The tragic truth is that they had to die because a number of shady operators saw an opportunity to line their pockets by providing superstitious fools with a spurious drug!

If the men who pull the ropes of the illicit trade in rhino horns had lived in the East Africa of a century ago, they would have made fat profits out of the slave trade, without, however, enduring any of the hardships and dangers slave-hunters in the interior encountered. In the asphalt jungle of a modern city they would probably control strings of dope-peddlers. The slaughter which has lasted for so long, is going on. In 1959, Hong Kong quotations for good rhino horns stood at 85 shillings per pound – reason enough for the crooked traders to continue in business.

What can be done to secure the survival of the five species of rhinoceroses?

In most Asiatic countries in which rhino still occur, they enjoy absolute legal protection – but nothing, or very little, is done to enforce

this protection outside the few existing reserves. It must be admitted that in many places effective law-enforcement is practically impossible. Armies of game rangers would be necessary to control the remote jungle areas, and even if such armies were available, the poachers, with their local knowledge, would still have things very much their own way. The widespread superstitions concerning the medical properties of almost every part of a rhino's carcass offer such a tremendous inducement to the hunters, the killing of even one single specimen is so enormously lucrative for the jungle folk, that we cannot reasonably blame the governments for what is happening outside the areas which have been set aside as sanctuaries. More could – and should – be done to apprehend and punish people who are in possession of horns or other parts of rhinos, but in some countries, possessing and selling 'medicines derived from rhinoceroses' is not even illegal! This means that anybody who gets away with killing an animal – and this is very easy indeed – can afterwards reap the full profit from the spoils of his illegal action. Wherever there is no law against the possession and sale of rhino medicines, the authorities are simply playing into the hands of the poachers, and any law protecting the rhino is a piece of sheer hypocrisy.

One is deeply shocked to read the following lines in Lee Talbot's excellent report *A Look at Threatened Species*, which was published in 1959: 'Although the live animal is protected by law in the Union of Burma, it is legal to sell rhino blood and other parts as medicine, and in recent years several rhinos have been killed on official permits by high Burmese for medicinal purposes.'

The 'medicinal purposes', for which the poor beasts were murdered, are entirely imaginary, and one should expect 'high officials' of any country in the world to know this by now, even if the unsophisticated inhabitants of the jungle do not. There is, of course, the possibility that the officials were perfectly aware of the uselessness of the rhino medicines and only killed the animals for the sake of financial gain. Let us hope that things have changed since Talbot visited Burma – otherwise there will be no rhinoceros left in that country within very few years.

The black rhinoceros can still be shot for sport in many parts of Africa, and it is high time that this unfortunate state of affairs was

changed. In principle I am not against hunting. Frequently it is absolutely necessary to shoot animals in order to re-establish the disturbed balance of nature. But to go out in a Land-Rover, accompanied by a highly efficient professional hunter, in order to shoot an animal which is under heavy pressure from poachers and is getting rarer every day, can hardly be rated as a sporting achievement, especially since this particular quarry can be killed so easily. Any true sportsman must surely realise that the position of the people who are doing their utmost to put down illegal slaughter of rhino both in Africa and Asia becomes very badly prejudiced if money can buy the right to kill these animals with the full approval of the authorities. Hunting is a good sport, but its participants should never become accomplices in the extermination of a rapidly diminishing species! From the moment the killing of rhino under a sportsman's licence is stopped, the possession of horns or other rhino trophies not registered before that date must, of course, become illegal. We hear a lot about African unity – here is an excellent opportunity for Pan-African co-operation, with rigorous steps to be taken in all countries concerned to enforce the absolute protection of the rhino! In this way a devastating blow could be dealt to the elusive middlemen who grow rich by smuggling rhino horns to the East.

The creation of sufficient reserves and national parks in suitable localities – suitable from the animals' point of view! – is naturally one of the very best ways to preserve our dwindling wildlife. The reader will remember with what success the southern white rhino, reduced to a point where it seemed impossible for them to breed up again, were saved through the Umfolozi Reserve being established in the nick of time.

Really to serve its purpose, a reserve naturally has to be a sanctuary, not only in the name, but in actual fact. It must be managed and guarded by a highly qualified and well-paid staff, for it is absolutely useless to hand rangers' badges to a few poor and uneducated native hunters, give them very little pay and put them in charge of a reserve, expecting them to protect rhinoceroses and other animals. In due course they will probably fall in with the poachers and get their share of the spoils. Draw your rangers from the hunting tribes by all means, for those are the people well versed in practical nature lore, but instruct

them thoroughly, give them a course in game management, pay them adequately, and most important of all, make them proud to be the men chosen to look after one of the nation's treasure houses. Several African countries – Kenya, Uganda and Tanzania among them – already have a considerable number of devoted native game rangers, who take a keen personal interest in the animals they have to guard and who are ready to risk their lives in defence of their charges. This is the kind of staff to build up in a reserve, if it is to be of any use at all. It is definitely a case where only the very best is good enough . . .

It may not always be possible to establish a reserve in the place where it is most urgently needed, for wherever animals are threatened through loss of habitat caused by human population pressure, there usually is not enough land available to safeguard the last survivors. The situation in the West Nile and West Madi Districts of Uganda, where after a very promising beginning the protection of the white rhino has utterly broken down, is a good example of this. The authorities have taken the one way out in the circumstances: realising that the rhino west of the river would most certainly be doomed in the near future, they decided to move as many as possible into the nearest properly guarded and administered reserve, in this case the Murchison Falls National Park. On the first expedition, the rhino had to be lassooed in the old fashioned rough-and-tumble way, because the right tranquilising drugs had not been projected and three rhinos were lost, eight being transferred to the Park. On a later attempt, the remaining rhino were darted by means of a crossbow from a pursuing Land-Rover and even from a helicopter. Both these operations were featured in 'Survival', the Anglia Television series of wildlife documentaries to which Survival Books are so closely allied. These two catching operations have now provided Murchison Falls National Park with sixteen white rhinos which, with luck, will prove a satisfactory breeding nucleus.

The darting which involves tranquilising with Sernylon is being used in South Africa, in order to prevent overcrowding the Umfolozi Reserve. The surplus rhino are being transported to other sanctuaries, both within and outside their former range.

In Kenya a considerable number of black rhino have in recent years

been removed to various reserves from areas needed for settlement – a very encouraging change-over from the rhino massacre mentioned in an earlier chapter. In Tanganyika, rhino have recently been brought to an island in Lake Victoria.

Operations like moving the white rhino across the Nile into the Murchison Falls Park can only be undertaken at considerable expense and may sometimes be beyond the means at present available to the countries involved. Fortunately there now exists an international body which can offer support to projects of this kind. I am, of course, referring to the World Wildlife Fund. In the few years of its existence, this organisation has already left its mark in many parts of the globe. Considerable funds have, for instance, been made available for the transfer of the white rhino in Uganda, for moving surplus rhino from Umfolozi to reserves in Southern Rhodesia, and for research into the ecological requirements of the Javan and Sumatran rhinoceroses. The World Wildlife Fund is working in close co-operation with the International Union for the Conservation of Nature, which has established a Survival Service Commission in order to make a careful study of the numerous species of animals and birds threatened with extinction, and to work out proposals on how pressure can be reduced and survival guaranteed. The present position of the rhino being what it is, a special Rhinoceros Group has been formed within the Survival Service Commission. It is doing excellent work under the able chairmanship of Dr W. T. Schaurte, a well-known German industrialist who is devoting a considerable amount of time and energy to the problems of these much harrassed animals.

It must be pointed out that the World Wildlife Fund can only give help if it, in turn, gets full support. Many a worthwhile project has had to be shelved because there simply was not enough money in hand. It is up to all of us to keep this excellent organisation on its feet. Ever since he fashioned his first stone axe, man has been a ruthless despoiler of the animal world – now is his chance to turn round and hold out a helping hand to the creatures which share this planet with him!

As things are today, I am sure that it should be possible to preserve the African rhinoceroses for posterity. We have seen how well the white rhino respond to protection, and the black species is still numerous

enough to stand a good chance. In stating this, I do not want to appear unduly optimistic for, as I have pointed out before, there is absolutely no room for complacency. I only want to stress that, given the necessary goodwill, efficient co-operation between the various African countries, and the courage not to back away from taking stern measures, there is no reason why these interesting creatures should not remain with us. They could, on the other hand, be wiped out within the next ten years!

As far as the Asiatic rhinoceroses are concerned, the situation is very much worse. Of the three, the Indian rhino is the most numerous, and some of the reserves in which it still occurs, can certainly be considered as very well guarded and efficiently managed. All of them are, unfortunately, surrounded by a rapidly increasing population which is highly superstitious with regard to rhinoceroses, and there is no doubt whatever that widespread political troubles or a decline of government interest in conservation would immediately bring about poaching on a very massive scale. There is also the fact that the reserves are situated in one of the world's danger areas. A few years ago there was a full-scale war on the borders of Assam, and one shudders at the thought of what might have happened to the rhino if the Chinese armies had poured down into the plains! At the moment, the Kaziranga rhinoceroses are doing so well that a few specimens can be caught from time to time, to be sold to zoological gardens. Gadadhar and Joymothi of the Basle Zoo both came from Kaziranga, and we know now that the species will breed well in captivity. There are already so many individuals outside Assam, Bengal and Nepal, that the Indian rhinoceros could perhaps be saved in the same way as Père David's deer and the European bison, in case of some man-made catastrophe overwhelming the reserve. Nobody seems yet to have considered the possibility of establishing a rhino sanctuary in some politically stable corner of the world. One could well visualize fifteen to twenty Indian rhinos doing well and increasing in numbers within a large enclosure in Florida, Louisiana, or on the Gulf Coast of Texas. Such a scheme for providing additional safeguards for the original unicorn should not be beyond what can be achieved in international co-operation.

The future of the other two Asiatic species can only be viewed with utmost concern. The Sumatran rhino has the advantage of larger numbers, but the surviving individuals are scattered over an enormous area, and the few groups which have a certain amount of protection seem to be rather small. The last Javan rhino are all gathered in one area, where a fairly close watch can be kept over them. Their numbers, though terribly low, are probably not less than were those of the white rhino in the Umfolozi area at the turn of the century. Unfortunately, their rate of reproduction seems to be far from satisfactory. From the information available, it is not yet clear if poachers somehow sneak in and get most of the calves, or if there are some biological or ecological factors which keep the rhino from breeding properly. In addition, the concentration of the whole surviving stock in one single reserve is not without its dangers. While the existing Sumatran rhinoceroses could not possibly all be wiped out within a few weeks, this might easily happen to the Javan rhino. A serious political upheaval would almost certainly bring about a breakdown in the administration of Udjung Kulon and leave the animals at the mercy of the poachers. What, if Krakatau Volcano, only fifty miles away in the Sunda Straits, should blow up again, as it did in 1883, wreaking terrible havoc all along the coastal areas of Java and Sumatra? The last Javan rhino could be annihilated in a few minutes!

So precarious is the status of these latter two species within their last remaining habitats, that the establishment of a stock in captivity, or in the semi-captivity of a safe and strictly controlled game park, is of the utmost importance. It may be the only real chance we have of preserving them, but, as far as I know, there is at the moment no Javan rhinoceros in any zoo, and Betina, the Basle Zoo's Sumatran rhinoceros, unfortunately died before a mate could be found for her. It might perhaps be possible, in an all-out effort untainted by petty national jealousies and similar useless idiosyncrasies, to get together ten or a dozen individuals of the Sumatran species in one safe place. But we may well have missed our chance as far as the Javan rhino is concerned. Time is, unfortunately, running out on us, and running out fast! There is talk of wiping out the superstitious beliefs so harmful to the rhino by means of

education. An excellent idea – if that education had started several hundred years ago! By all means, let us do what we can, but personally I cannot see much benefit coming from such a scheme before it is too late and all the Asian rhinos have been killed. Just look at all the mumbo-jumbo still surviving in even the most highly-developed European countries!

Whatever we decide to do in order to save the Asiatic rhinoceroses – and more particularly the Javan and Sumatran species – it has to be done now, and there is no room for half-measures. Any delay may cause them to be added to the shockingly long list of animals that will never been seen again – Steller's sea cow, bluebuck and quagga, aurochs, European wild horse and Syrian ass, dodo, solitair, great auk, Carolina parakeet, passenger pigeon, Cuban ara, Eskimo curlew, and pink-headed duck. These are only a few of the mammals and birds mankind has exterminated by over-exploitation and even persecution. Many more have been thoughtlessly pushed out of existence by the destruction of their habitat or by the cats, dogs, pigs and rats that man has loosed upon them.

Grim as this tally of the lost ones is, we can take some small comfort from the presence amongst us of a few animals which had almost gone and which were saved at the very last moment. The southern white rhinoceros is one of them.

If they could be saved, why should we not be able to extend our thought and care to the really hard-pressed species, the Indian, Sumatran, and Javan rhino?

Appendix

THE GENERA AND SPECIES OF LIVING RHINOCEROSES

Order: *Perissodactyla.*

Non-ruminant ungulates with an uneven number of toes: one or three. If a fourth digit is present (forefeet of tapirs), it is shorter than the third. The weight is not carried by two toes, but rest mainly or entirely on the middle one.

Family: *Rhinocerotidae.*

Heavily built perissodactyls with three digits. Orbits not ringed by bone and cheek-teeth relatively simple. Canines always absent. One or two horns on muzzle. Four Genera.

1st Genus: *Rhinoceros.*

One horn. Two cutting teeth in upper and four in lower jaws. Four premolars and four molars in each jaw. Skin divided into shields by deep folds. 2 species.

Rhinoceros sondaicus Desmarest, 1822 (Rhinoceros javanicus Cuvier, 1829).

Javan Rhinoceros, Lesser one-horned Rhinoceros, Javanashorn, Schuppennashorn, Rhinocéros unicorne de Java, Rhinocéros de la Sonde. Cheek-teeth short-crowned. Skin scaly in appearance. Java, Burma (?), Siam (?), Indochina (?).

Rhinoceros unicornis Linnaeus, 1758.

Indian Rhinoceros, Greater one-horned Rhinoceros, Panzernashorn, Indisches Nashorn, Rhinocéros unicorne des Indes. Cheek-teeth with longer crowns. Tubercles on skin. Assam, Bengal, Nepal.

2nd Genus: *Dicerorhinus* (*Didermocerus*).

Two horns. Two cutting teeth in upper and lower jaws. Cheek-teeth short-crowned. One species.

Dicerorhinus sumatrensis G. Fischer, 1814.

(*Didermocerus sumatrensis* G. Fischer, 1814).
(*Didermocerus sumatraensis* G. Fischer, 1814).

Sumatran Rhinoceros, Asiatic two-horned Rhinoceros, Sumatranashorn, Rhinocéros de Sumatra, Rhinocéros be-corne de l'Indo-Malaisie.

Smallest living member of the Rhinocerotidae. Skin hairy in youth. Two subspecies.

Dicerorhinus sumatrensis sumatrensis G. Fischer, 1814.

Sumatra, Borneo.

Dicerorhinus sumatrensis lasiotis Buckland, 1872.

Hairy-eared Rhinoceros, Chittagong Rhinoceros, Rauhohrnashorn. Malaya, Burma, Siam (?), Indochina (?).

3rd Genus: *Diceros*.

Two horns. No cutting teeth. Cheek-teeth short-crowned. Upper lip narrow, its tip prehensile. One species.

Diceros bicornis Linnaeus, 1758.

Black Rhinoceros, Prehensile-lipped Rhinoceros, Schwarznashorn, Spitzmaulnashorn, Rhinocéros noir. Two (three?) subspecies.

Diceros bicornis bicornis Linnaeus, 1758.

Africa, from Natal to Sudan and N. Nigeria.

Diceros bicornis somaliensis Potocki, 1900.

Somali Republic, Ogaden.

Diceros bicornis occidentalis Zuckowsky 1922, (?).

Kaokoveld (South West Africa).

4th Genus: *Ceratotherium*.

Two horns. No cutting teeth. Cheek-teeth long-crowned. Upper lip squared. One species.

Ceratotherium simum Burchell, 1817.

White Rhinoceros, Square-lipped Rhinoceros, Weisses Nashorn, Breitmaulnashorn, Rhinocéros de Burchell, Rhinocéros blanc, Rhinocéros camus. Two subspecies.

Ceratotherium simum simum Burchell, 1817.

Natal, Transvaal, S. Rhodesia, S.E. Angola.

Ceratotherium simum cottoni Lydekker, 1908.

Upper Nile, Garamba National Park, E. Ubangi.

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