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**BY RUDOLPH BIGALKE**

The  
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GARDENS  
OF SOUTH AFRICA**

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THE NATIONAL ZOOLOGICAL GARDENS  
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# THE NATIONAL ZOOLOGICAL GARDENS OF SOUTH AFRICA

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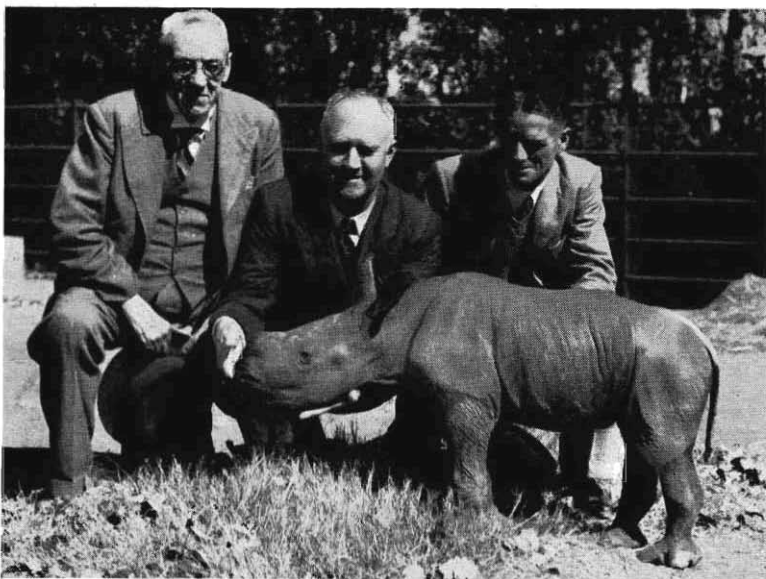
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imals have been bred in the enclosures in the intervening years.

One of the new Bear Pits on the Zoo Extension was also completed in the year 1940 and a pair of Himalayan Bears was placed in it. In June of the year 1941 a second pit was completed and stocked with a pair of Black Bears. Later in the same year another pair of Black Bears was introduced into the same pit, and the third and last enclosure for bears was stocked with a Brown Bear in February of the year 1944.

Apart from the unfinished enclosure for monkeys, the whole of the slopes of the Daspoort Hills within the Northern Extension have now been laid out on the most modern lines. The Board resolved to commemorate the long and useful services rendered by the late Justice Carl Jeppe by naming the enclosures on the hillside the Carl Jeppe Terraces. A bronze tablet was erected in the year 1941.

Mrs. Eileen Orpen made a splendid gift to the Board of Trustees for the purpose of building a modern aviary. A spacious circular aviary with a concrete roof was designed by Mr. W. A. Macdonald of the Public Works Department, and this aviary was built on the Northern Extension out of Mrs. Orpen's gift. A collection of the



*Photo by Martin Gibbs.*

Female White Rhinoceros "Zuluana" at the age of nine days.  
From left to right: Dr. R. Broom, Dr. R. Bigalke, Dr. V. Fitzsimons.

## CHAPTER 5

### VALUABLE ACQUISITIONS

There is probably no head of a zoological garden anywhere in the world, who does not cherish the hope that he will at some time be able to exhibit animals that have previously not been shown elsewhere. The steady reduction of wild life, even in the less civilized parts of the world, and the consistent efforts to protect rare species against complete extermination make it increasingly difficult to obtain the animals required by zoological gardens. The world will never know about the sheaves of letters that are written, and the frustrations and disappointments that have to be faced by those in charge of zoological gardens in their efforts to get new animals, particularly when funds are inadequate.

The desire to exhibit animals that have not previously been shown is not merely prompted by a wish to be first in the field. While this certainly has propaganda value for a zoo, the scientific aspect is more important. It is only when mammals can be kept in captivity that studies on such subjects as breeding, growth, physiology and dental succession can be attempted. In the case of birds and some other kinds of animals the breeding habits can often be studied out in nature. Our present-day knowledge about the gestation period, breeding habits, growth and structure of a wild animal so well known as the Lion is almost entirely the result of studies made in zoological gardens. In the case of the Lion, and also in that of other mammals, only insignificant contributions have hitherto been made to our knowledge of these subjects from observations made in nature. It is clear that this must be so, because of the practical difficulties encountered when such studies are attempted on mammals occurring in the free state.

In captivity, too, much information can be gained about the habits and behaviour of wild animals, and this not only supplements but also acts as a check on the studies made in nature.

Except in zoological circles, it is not generally realized that our edifice of knowledge about the animal life of the earth would have been very much less imposing, if zoologists all over the world had not studied animals in zoological gardens and laboratories. This does not, of course, apply to ecological studies, which, dealing as they do with animals as units of their natural environments, must be carried out in the natural environment in which the animals occur.

The most valuable additions to the national collection during my term of office are undoubtedly a pair of Zululand White or Square-lipped Rhinoceroses now in the Zoo. The possibility of obtaining these huge mammals was explored as far back as November of the year 1928. About that time there was a prospect that some Square-lipped Rhinoceroses would be transferred from the Umfolosi Game Reserve in Zululand to the Kruger National Park. Formerly this animal was abundant in the present Kruger Park area, but according to Kirby<sup>4</sup> it disappeared from the Matamiri bush in the south-eastern part in the year 1896. It was the wish of the late Mr. Piet Grobler, at that time Minister of Lands, that the National Parks Board should try to re-establish the Square-lipped Rhinoceros in the Kruger Park. When he opened the first meeting of that board on 16th September, 1926, Mr. Grobler drew special attention to the case of the Square-lipped Rhinoceros; he thought that it would be a very good thing if this rare species could be brought to the Kruger National Park. At Mr. Grobler's request Mr. Herbert Lang proceeded to Zululand and submitted a long report on the Zululand White Rhinoceros in May of the year 1928. This report also dealt with possible methods of capturing and transferring White Rhinos to the Kruger Park.

In August of the year 1933 another attempt was made through the Secretary for the Interior to obtain a young Square-lipped Rhinoceros for the National Zoological Gardens. Joint representations were made with the Director of the Transvaal Museum, Mr. C. J. Swierstra, and the help of Senator C. F. Clarkson, at that time Minister of Public Works and Posts and Telegraphs, was also solicited. Although this effort was also unsuccessful, the Provincial Secretary of Natal intimated that the request would be borne in mind if it should be possible at some future time to meet the needs of the Zoo. The matter was revived in the years 1936, 1938 and 1945. In the latter year the possibility of adding the so-called "corridor" to the Hluhluwe Game Reserve in Zululand was meeting with attention. At that time there were a number of Square-lipped Rhinos in this "corridor", and some of them were accustomed to wander out to the west. The prospects of getting a specimen of the rare Square-lipped Rhinoceros now seemed to be more hopeful.

After these preliminary efforts had paved the way, success came unexpectedly and with dramatic suddenness.

On 26th July, 1946, the Honourable D. E. Mitchell, Administrator of Natal, telephoned me from Durban at 12.30 p.m. and stated that a baby female Square-lipped Rhinoceros had been obtained in Zululand. He generously offered the animal for the national collec-



*Photo by W. F. Schack.*

Female White Rhinoceros "Dengezi" soon after her arrival at the Zoo. The animal has been blindfolded by the keeper, Mr. J. Grobler, for easier handling.

tion and suggested that a lorry be sent to bring it to Pretoria. This kind offer was promptly accepted, and at 5 p.m. on the same day Keeper K. de Waard and Mr. R. Bruins-Lich left the Zoo by lorry to fetch the baby. They drove right through the night and reached Captain H. B. Potter at the Hluhluwe Game Reserve at about 7.45 p.m. on 27th July. The following morning they proceeded to the Nagana Research Station at Masimba and reached the animal at about 9 a.m. At about 12.15 p.m. on the same day (28th July), they left for Pretoria and again drove right through the night. Pretoria was reached on Monday, 29th July, 1946, at about 1.30 p.m. After a trip of approximately 425 miles from Zululand, "Zuluana", as the baby was called at Captain Potter's request, was safely in the National Zoological Gardens. In fetching this animal the lorry covered a distance of about 860 miles.

The manner in which "Zuluana" was procured is related as follows by Mr. A. Adank, at that time the Senior Game Ranger in Zululand: "The belt of Crown Lands around the Umfolosi Game Reserve is from five to eight miles wide and is known as the 'buffer zone'. Some time ago a few White Rhinos from the southern buffer zone wandered on to the farms on the south and caused some damage to fences. It was then decided to attempt to drive

the Rhinos out of the southern buffer zone through the White Umfolosi River into the Umfolosi Game Reserve.

“Captain Potter, the Game Conservator of the Hluhluwe Game Reserve, placed five reliable game-guards at my disposal. With these, ten of my own game-guards and 70 labourers (native) from our bush-clearing works, our first day’s drive on 23rd July, 1946, proved unsuccessful, as the Rhinos stampeded back as soon as they got near the river.

“On 24th July, 1946, the drive was repeated over the same area with the same natives, when we managed to chase a few (White Rhinos) through the river. While the drive was proceeding on the second day, one of my natives came and reported to me that a (White) Rhino cow, scared by the noise, had left its baby near the hyaena caves under the Sangoyana Hills. I sent him back immediately with instructions to guard it against the hyaenas, of which a pack of eight had been seen in the same vicinity during daytime about a week before.

“I reported the matter to Captain Potter, who anticipated that the mother would return, and if she did not, the question arose where milk was to be obtained, as everybody in that part of Zululand used tinned milk which was unobtainable for most of the time. I begged to be given the opportunity to try and rear it (i.e. the baby White Rhinoceros), and stated that I did not mind giving most of my salary for this purpose every month. Captain Potter granted permission on condition that if I found its mother had come back, I should let it go. I was happy that I was allowed to adopt this child and, asking Mr. T. Scheepers and Mr. K. de Haas to accompany me, I started the journey to Sangoyana with a three-ton lorry on which I had my camping equipment. We got to the Rhino an hour before sunset; it was a relief to find that the mother had not returned.

“I spread my tent to pad the lorry near the cab, then spread my mattress on the tent. We put the Rhino into a bag up to the neck to prevent her fighting to get up, then lifted her gently on to the bed where she fell asleep after the first mile and slept until we got to the camp of Messrs. Scheepers and de Haas, 15 miles from the Nagana Research Station. From there two natives were placed in charge of the Rhino, while I drove on, cruising down the hills and holding thumbs for petrol whenever we went uphill. The petrol lasted to within three miles from the Research Station. I paid a native five shillings to run for petrol, and Mr. Scheepers from the Research Station brought some. It took five minutes to prepare the room and put ‘Zuluana’ where Mr. de Waard found her (i.e. at the Nagana Research Station).



“As my car was at a garage for repairs, I got Mr. Scheepers to take me in his private car at one shilling a mile to find milk. We travelled 35 miles with no success and we were back at 11 p.m. We gave ‘Zuluana’ a little ‘Klim’ which Mr. Goosen could spare. She greedily sipped it out of a dish.

“I obtained permission to use my half-ton official lorry to go and see whether I could raise one of my own cows at Mkuzi with enough milk to rear the Rhino. At 11.30 p.m. I started for Mkuzi.

“It is very dry at Mkuzi, and I did not have a cow with sufficient milk. So I bought one for £20. At 2 p.m. (25th July, 1946) I had offloaded and milked the cow here (i.e. at the Nagana Research Station) and ‘Zuluana’, after only two feeds of ‘Klim’, got her first feed of cow’s milk. The speedometer registered 190 miles.”

It is clear from this interesting story that the acquisition of the baby White Rhinoceros by the National Zoological Gardens was the result of a series of fortunate events. As no specimen of this rhinoceros had previously found its way into a zoological garden anywhere in the world, the event was one of great importance, and the news was flashed around the world. In view of its importance from the zoological point of view, “Zuluana” was kept under close observation and a paper was later published in the Proceedings of the Zoological Society of London (Proc. Zool. Soc. London, Vol. 120, Part III, November, 1950).

The Board was now in possession of a young female Zululand White Rhinoceros and the next step was, of course, to try and get a mate for this animal. In September, 1947, I proceeded to Natal and had discussions with the Administrator, the Honourable D. E. Mitchell, and the Chairman of the Zululand Game Reserves and Parks Board, Mr. W. M. Power, in Pietermaritzburg. My visit was continued to the Umfolosi Game Reserve, where I saw 16 White Rhinoceroses in parties of two, three, three, four and four in one forenoon. But the prospects of getting a bull were not very encouraging. Nothing happened until 8th January, 1949, when success again came most unexpectedly. On that date Mr. W. W. Williams, Secretary of the Natal Parks, Game and Fish Preservation Board, telephoned me at 7.30 p.m. to convey the good news that a young White Rhinoceros bull was available in Zululand and should be sent for. He also spoke to Mr. S. A. Lombard, Provincial Secretary of Transvaal, who kindly offered assistance through the Conservator of Fauna and Flora, Dr. T. G. Nel. It was suggested by Mr. Lombard that the animal might be brought to Pretoria by air, but investigation showed that there were certain risks, and hence it was decided to send a lorry. Dr. Nel went to Zululand in this lorry accompanied by one of the Zoo’s keepers,

Mr. J. Grobler, whose task it was to take care of the precious animal.

The story of the capture of the bull as related by Mr. W. E. Foster, an officer of the Nagana Research Station, is as follows:—  
“On the 5th. inst. (i.e. 5 January, 1949), whilst I was in the Umfolosi Game Reserve, two of the game-guards reported to me that there was a dead White Rhino cow in the Mpafa Valley and that its calf (a male) was with it. I immediately proceeded to the spot with Mr. G. Cronje, Mr. Grabe and about 15 natives. On arrival the calf had disappeared in the thick bush. The game-guards reported that when they found it, it was chasing the vultures from the carcass of its mother. This was confirmed by the spoor. I formed the opinion that this calf was not old enough to fend for itself, and on my return to Masimba I told one of the game-guards that if they found the calf it was to be reported. I advised Captain Potter.

“The dead animal had a wound about 15 inches in length near its shoulder-blade and several ribs were found to be broken and several others badly bruised. I am convinced that the animal either died as the result of fighting, or that it had fallen into a near-by stony donga and had been able to drag itself to the place where it was found dead. There was no evidence of bullet or assegai wounds.

“On the morning of the 8th. the game-guards reported that the calf had been seen on the 6th. When this report was made, I arranged for a party in charge of Mr. Adank to proceed at once to try and catch it. The party consisted of Mr. Adank, Dr. R. du Toit (a veterinary officer from Onderstepoort), Mr. P. van Rooyen and about 15 natives. On arrival there they found the calf was still busy chasing off the vultures from its mother. Mr. Adank reported that they set a rope noose alongside of the carcass and that twice it fouled the noose; the third time it was caught and secured and brought to Masimba. I estimate its age as 12 months old. I reported its capture immediately to Captain Potter.”

It has already been related how Mr. Adank went to a great deal of trouble to try and save the life of the baby White Rhino “Zuluana”, and it was fortunate indeed that he was also available to capture “Folosi”, as the bull was named at Captain Potter’s suggestion.

Mr. Foster has spent many years in Zululand and is familiar with the habits of the Square-lipped Rhinoceros. On one occasion he found the skeleton of a cow sandwiched between two rocks and beside it was the skeleton of her calf. On such occasions the calf perishes with the mother if the little animal is not old enough to care for itself. Mr. Foster was determined that in the present case

“Folosi’s” skeleton should not bleach on the veld of the Mpafa valley.

Folosi was believed to be about a year old when captured and hence was much larger than Zuluana, which was only a day old when she was found in the veld. During the night of the 8 January, 1949, Folosi nearly escaped from the room in which he was being kept at Masimba. The entrance was closed with one and one-half inch planks, but he charged these and cracked some of them. Had it not been for the fact that a motor lorry had been pulled up against the wooden barrier, Folosi would probably have got away and perished in the veld.

Dr. Nel and Mr. Grobler reached Captain Potter at 3 p.m. on the 9 January, 1949. When they arrived at the Nagana Research Station somewhat later, they found that Folosi was wild and would have to be tamed before he could be transported to Pretoria. Mr. Grobler spent most of his time with the animal in the room. While Folosi was still loosely secured with ropes, Mr. Grobler succeeded in blindfolding him with the help of six others. Folosi now became much calmer, and Mr. Grobler fed him regularly and tried to tame him. If Folosi rushed at him, he was able to get out of the way by hauling himself up on a rope suspended from the roof. After a few days Folosi had calmed down to such an extent that the trip to Pretoria could be undertaken. He was placed in a strong crate built for the purpose, and the party reached the Zoo at 7 a.m. on the 16 January, 1949.

On account of the fact that Folosi and Zuluana were the first two Zululand White Rhinos to be exhibited in captivity, the Government undertook to build a special enclosure for these valuable animals. On the 1 March, 1949, the two rhinoceroses were transferred to this enclosure, and it is expected that they will breed in due course.

By an extraordinary stroke of good fortune, a third White Rhinoceros, a young female about a year old, was received from the Umfolosi Game Reserve on the 23 August, 1952. This animal has been named Dengezi.

On the island of Celebes and islands to the south thereof, there occurs the smallest kind of buffalo in the world. This animal is the Anoa, Dwarf or Pygmy Buffalo. Its nearest relative, the Tamarao or Tamarau, is slightly larger and is found on Mindoro, one of the Philippine Islands.

The Anoa in the National Zoological Gardens are descendants from two specimens that were acquired from the Fort de Kock Zoo in Sumatra by way of exchange in the year 1936. They are by no means common animals in zoological gardens. That the insti-

## CHAPTER 6

### EXCHANGES

It is a common practice throughout the world for zoological gardens to obtain some of their requirements, particularly of exotic animals, by means of exchanges. This method has always been, and still is, the cheapest and most satisfactory manner of getting exotic animals. Such exchanges are made on a basis of mutual trust, and if difficulties do arise, they are generally more easily settled between the directors of zoological gardens than between animal traders and zoo directors.

When the list of animals to be exchanged has been agreed upon, the sender undertakes to deliver his animals at the recipient's nearest port. But it is a tedious matter to effect an exchange of wild animals, and many months usually elapse before they can be sent. Apart from delays in getting the necessary permits, shipping is expensive nowadays, and it is not always easy to get space on ships. As a rule the permits cannot be obtained until the vessel's name can be furnished. Transportation by air is the ideal method of sending wild animals, but it is still so expensive that only consignments of small or young animals are at present sent in this manner.

Among the permits required under present circumstances is a permit from the Department of Imports and Exports. Sometimes it seems as if the officials in that department are reluctant to believe that no foreign currency is required for the exchange of wild animals. But as the sender in each case delivers his specimens at the receiver's nearest port, it should be perfectly obvious that no foreign currency is involved.

If a consignment consists of only a few animals, it is not as a rule necessary for a special attendant to accompany them. In such cases arrangements are made with the butcher on board ship to care for the animals. He is provided with full details for their care and feeding, and if the latter are not flesh-eaters, sufficient food for the voyage is sent along with them. But in the case of carnivorous animals the necessary meat must be supplied by the ship's butcher. In the case of large or valuable consignments or delicate animals that justify the additional outlay, it is customary to send a keeper along with them.

To obtain wild animals by purchase from dealers is expensive. In the case of the National Zoological Gardens it has only been possible on rare occasions to buy animals from foreign sources.

The following are a few recent quotations for animals from Kenya delivered at Mombasa:—

African Elephant calves, per pair .. ..	£1,260 to £1,780.
Black Rhino calves .. ..	£1,080 to £1,680.
Hippopotamus (adult) .. ..	£1,260 to £1,680.
Giraffe (6 to 10 feet) .. ..	£340 to £400.
Kudu .. ..	£280 to £340.
Sable Antelope .. ..	£300 to £360.
Roan Antelope .. ..	£300 to £360.
Lion .. ..	£160 to £500.
Chimpanzee .. ..	£300 to £500.

In the year 1948 the prices for some of the above animals from the same source were as follows:—

African Elephant calves, per pair .. ..	£1,500 to £2,000.
Black Rhinoceros calves, per pair .. ..	£1,200 to £3,000.
Hippopotamus adults, per pair .. ..	£4,000.

During the 42 years 1909-1951, the average expenditure incurred by the management of the National Zoological Gardens on the purchase of animals amounted to slightly less than £500 per annum. It is clear, therefore, that if this national institution had to depend upon such sources of supplies as those indicated, it would be virtually impossible to stock the collection.

The National Zoological Gardens have seldom had sufficient funds to purchase exotic animals for the collection. It has been necessary, therefore, to arrange exchanges with zoological gardens in other parts of the world and to encourage breeding as much as possible. Attempts have constantly been made, also, to obtain animals as gifts, and no little success has been achieved. As described previously, the first pair of Zululand White Rhinos ever exhibited in captivity was obtained as a gift from the people of Natal.

In September of the year 1929 the Committee of Management of the Zoo agreed to undertake the following exchange of animals with the Director of the Singapore Zoo:—

2 Pairs Transvaal Zebras	} in exchange for {	2 Tigresses
1 Pair Blue Wildebeeste		3 Black Leopards
1 Pair Bushbucks		2 Grizzled Grey Tree Kangaroos
4 Chacma Baboons		2 Cassowaries
4 Vervet Monkeys		4 Argus Pheasants
6 Rock Rabbits		3 Crested Fireback Pheasants
4 Stanley Cranes		10 Nicobar Pigeons
8 Spurwinged Geese		2 Greater Birds of Paradise
6 Egyptian Geese		5 Red-crested Wood Partridges
4 Crowned Guineafowls		
8 Swainson's Francolins		

## CHAPTER 7

### SUCCESSFUL BREEDING

Every head of a zoological garden likes to breed as many animals as possible in the collection entrusted to his care. There are several reasons for this. In the first place, successful breeding simplifies the problem of keeping a zoological garden stocked with animals. It provides specimens for exchanges with other zoos and is also a source of income from the sales of surplus specimens. Equally important is the fact that when the animals breed well, the head knows that he has established suitable environments for his animals. Successful breeding also has publicity value.

From the scientific aspect the breeding of wild animals in zoological gardens furnishes opportunities for making observations that cannot be made elsewhere, and hence contributes towards the advancement of knowledge. Although the list of animals that have not yet bred in zoological gardens is becoming shorter from year to year, there are still many kinds that have not been bred.

I have not been able to find any record of the breeding of the Cheetah in captivity. According to Wilhelm<sup>6</sup> the gestation period is about 90 days, but he does not indicate how his information is arrived at. If the Cheetah should breed in the National Zoological Gardens at any time, it is hoped that there will be an opportunity to determine the gestation period.

It is not known at what age the Zululand White Rhinoceros (*C. simum simum*) begins to breed. Although Kenneth<sup>3</sup> states that the average gestation period of *C. simum* is 548 days and the maximum 578 days, the former figure is merely an estimate of 18 months made by Lang.<sup>5</sup> If the Zululand White Rhinoceroses in the National Zoological Gardens should breed at any time, an attempt will be made to determine the gestation period. As the one cow's age is known to within a day, it will then also be possible to indicate the age at which she began to breed.

Sometimes there are opportunities for making unusual observations in zoological gardens. Such an opportunity presented itself to the Zoo's Foreman, Mr. T. Combrink, on the 20th April, 1951.

Kangaroos breed fairly well in the National Zoological Gardens, but on account of their remarkable breeding habits it is very seldom possible to determine the actual date of birth. That a female has a baby can nearly always be seen only when the baby has grown to

December, 1928, a pair of Coyotes was received from the Toronto Zoological Gardens in exchange for S. African animals. The male lived until the 11 October, 1943, and the female until the 31 August, 1944.

On the 1 September, 1914, a male Chimpanzee was acquired from an animal dealer after whom he was named Joseph. For many years Joseph was a well-known inhabitant of the Zoo, where he lived until the 22 June, 1940. This longevity of 25 years 9 months and 21 days is among the world's longest for chimpanzees.

A male Guinea or Green Baboon received in exchange on the 22 April, 1908, was in the collection until the 20 February, 1934. The longevity of this animal, namely 25 years, 9 months and 29 days is probably a world record for this kind of baboon.

Another baboon that lived a long time in the national collection was a male Yellow Baboon that was presented to the Zoo on the 13 April, 1923, and that lived until the 20 August, 1939, that is to say for a period of 16 years 4 months and 7 days.

A longevity record of a South American monkey that calls for special mention is that of a female White-throated Capuchin. This animal reached the Zoo on the 21 October, 1914, and died on the 3 December, 1943. The longevity of 29 years, 1 month and 12 days is among the longest known for this species. This monkey was well known to thousands of visitors and was a favourite among children for many years.

If we turn to the largest kinds of mammals such as elephants, rhinoceroses and the like, we find that some good longevity records have been attained in Pretoria.

The Zoo's first Indian Elephant cow named Mary was a gift from the late Mr. Samuel Marks. She reached Pretoria on the 26 February, 1906, and lived until the 18 November, 1942, that is to say for a period of 36 years, 8 months and 23 days. Unfortunately her age on arrival is not known. Major Flower's published records show that there are not many Indian Elephants that have lived longer in captivity than Mary did.

As stated previously, an African Elephant cow purchased on the 11 October, 1913, died in the Zoo on the 21 July, 1937, after she had been in the collection for 23 years, 9 months and 10 days.

A Black Rhinoceros cow named Maggie was purchased on the 31 December, 1914, for the sum of £125. This animal died on the 15 November, 1942, after it had been in the collection for a period of 27 years, 10 months and 15 days. At the time that this record was sent to Major Flower, he stated that it seemed to be a world record for the longevity of a Black Rhinoceros in captivity.

An African Buffalo was purchased on the 9 September, 1914.

## CHAPTER 12

### SCIENTIFIC AND CONSERVATION WORK

After more than half a century of expansion, the National Zoological Gardens are not yet equipped or staffed for regular scientific work. It is a great pity that much valuable zoological material cannot be used on account of the lack of facilities and staff. The administration of the Zoo is divided between the Director and the Professional Assistant. The work takes up so much of their time, however, that little is left for scientific work. But it must not be inferred that no scientific work at all is being done. From time to time opportunities for scientific study have been made use of, with the result that some thirty papers have been published by the Director and successive Professional Assistants on scientific and conservation problems. But much more could be done if the facilities and staff were available. When the Zoo's hospital is built, provision for a zoological laboratory will be made.

For many years material that is of interest to the Transvaal Museum has been placed at the disposal of the Director of that institution. In this manner the Museum has obtained exotic and other material that is not easily obtained elsewhere. The skeletons of the Zoo's famous Chimpanzee, Joseph, and its Orang-Utan, Nat, are now both in that Museum's collection.

Osteological material has from time to time been placed at the disposal of the Professor of Zoology of the University of Pretoria, where it is used by students for study purposes. At times research institutions of various kinds have also been helped to get the animals required for their work.

There are various branches of zoology in which research can be done at the National Zoological Gardens. In the Union the vertebrate groups of mammals, birds and reptiles are large groups represented by many hundreds of kinds. The number of workers in the field of zoology has always been small in S. Africa, where most of the work has been done at the larger natural history museums and universities. But on account of the great many kinds of animals found in the country, research at the museums is to a large extent still limited to taxonomic work, that is to say the naming and accurate description of the species. This work is of fundamental importance, because research on any kind of wild animal is of no value unless it can be tacked on to a named species,



so that the kind of animal can be recognised by any zoologist working in any part of the world.

Taxonomic work will always be one of the functions of a natural history museum, but as time proceeds, it is probable that taxonomists will pay more attention to the internal structure of animals for purposes of classification. Important contributions to this knowledge can be made by morphological studies on material obtained from zoos. Apart from such studies in some vertebrate groups like the *Amphibia* (frogs and toads) and osteological work on S. African fossils, much remains to be done in the field of the anatomy of our indigenous fauna. There is no doubt that when this work is tackled in earnest, it will result in modifications in our present systems of classification.

Present-day knowledge about the gestation periods of wild animals has almost all been gained from observations made in zoological gardens throughout the world. To a lesser extent this applies to the incubation periods of birds. Much remains to be learned about these subjects, and most of the knowledge will have to come from zoos. Earlier it has been pointed out that we do not yet know the gestation periods of such animals as the Cheetah and the Square-lipped Rhinoceros of Zululand. Some of the known records are doubtful and must be checked against new studies.

Closely associated with the determination of the gestation periods of mammals and breeding studies of birds and other animals are studies on the reproduction and growth of wild animals. From the nature of the case, most of this information will have to be gained from animals kept in zoological gardens.

Other important studies that can be carried out in zoos almost to the exclusion of elsewhere are studies on the longevity of wild animals, a subject that was dealt with in a previous chapter.

Associated with the morphological work are also the opportunities afforded of collecting external and internal parasites for study by parasitologists. There is no doubt that many kinds new to science will still be collected from animals that find their way to zoological gardens.

Diseases of wild animals are also a subject for study in zoos that are equipped for the purpose. Here, too, much remains to be done and much new information will become available during the course of time.

Nutritional studies are of importance, particularly in the case of animals that have specialised foods for which it is not a simple matter to find substitutes. To mention but one example, it has been found to be very difficult to keep the Scaly Ant-eater of S. Africa alive in the National Zoological Gardens. This animal is adapted