

lactation. The results were published (Gregory *et al.*, 1965).

The second calf, Ronald, was sent to Dublin Zoo in the spring of 1963 and the adult pair were once again reintroduced. The fighting seemed to be more violent than at the previous re-introduction and it was only possible to keep them together for periods of not more than one hour a day. Eventually they became quieter and mating occurred on three occasions, the last two being on successive days. The inter-oestrous period was 21 days.

The third calf, a female, 'Rhona', was born at 1027 hours on 24 August 1964, 438 days after the last mating. The birth was witnessed by a keeper who was preparing the adjoining den. At 1025 hours there were two bursts of water from the vagina, similar to those reported by Faust (1958) at Frankfurt Zoo. Two minutes later the female placed her nose flat on the ground and gave three grunts. On the third grunt she gave a big heave and the baby 'shot' out, while the mother was still standing. The baby landed about  $1\frac{1}{2}$  m away with a thud. As with the Frankfurt baby rhino, there were no membranes attached to the baby. The mother ran off, pivotted, charged towards the baby, stopped suddenly and smelt it. The baby stood up within half an hour of the birth and had suckled within two hours.

## Breeding the Black rhinoceros

*Diceros bicornis*

### at Hanover Zoo

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On 28 June 1965 a male Black rhinoceros *Diceros bicornis* was born, probably in the morning, at Hanover Zoo.

The pair had been together since May 1962, when the male, which had been caught in the Isiolo area, Kenya, was thought to be four years old, and the female, which had been caught in the Mara Veldt, Tanzania, was thought to be six years old. Since October 1962 the female had

As with the two previous births, the placenta came away during the fourth hour after the birth. This time the mother appeared to assist its expulsion by walking backwards and stepping on the part that was touching the ground. She then turned and smelt it, making no attempt to eat it, though she had eaten a small portion after the second birth.

The third calf, although a normal healthy youngster, had a rectal prolapse on 8 January 1965. It is believed this may have been caused by one of the mother's horns during play. The calf was crated and underwent successful surgery. She was returned to her mother the following day and remained with her until the end of June 1966 when she was transferred to Bristol Zoo's country estate about five miles away to join a younger male born at Hanover Zoo (see pp 161-162). At the time of writing (August 1966) the parents are still separated.

#### REFERENCES

- GREED, R. (1962): Composition of the milk of the Black rhinoceros. *Int. Zoo Yb.*, **2**: 106.  
 GREGORY, M. E., ROWLANDS, S. J., THOMPSON, S. Y., and KON, V. M. (1965): Changes during lactation in the composition of the milk of the African rhinoceros, *Diceros bicornis* Linn. *Proc. zool. Soc. Lond.*, **145**: 327-333.  
 FAUST, R. (1958): *Zool. Gart. (NF)*, **22**: 208-214.

come into oestrus regularly. Each oestrus lasted about three or four days, and the inter-oestrus (measured from the first day of one oestrus to the first day of the next) was between 26-30 days. During oestrus the female urinated more often than usual and a small amount of mucous was secreted from the swollen vulva. Attempts at mating were observed but these were not successful as either the male mounted the female

incorrectly and therefore could not introduce his penis into the vagina, or because the female would not accept him. At last a successful copulation was observed during the afternoon of 10 March 1964. It lasted approximately half an hour.

Until the day before the birth they were kept together, in the outside enclosure, though at night they were separated. From time to time, mainly during the third and fourth months of pregnancy, the female became very aggressive with the male and we had to separate them for a few days. On the day before she gave birth the female chased the male for hours.

From the ninth month of pregnancy onwards the udder started to swell steadily and from the 13th month onwards it increased in size considerably. Nine days before the birth the vulva was very swollen. On the day before the birth the female was very excited and defaecated continuously.

The calf was born after a gestation period of 469 days (15 months and  $2\frac{1}{2}$  weeks) measured from the last observed copulation. On the third day after birth the calf weighed 38.5 kg. Other birth weights of Black rhinos born in captivity have been 45 kg and 30 kg for two males, and 38 kg and 27 kg for two females.

During the first day the calf suckled several times for two or three minutes each hour. Apart from short intervals, it spent the whole day on its feet. The following days it suckled each hour, but it rested and slept for the remaining time. Suckling gradually reduced in frequency, but the length of the suckling periods increased to five or six minutes. By the 9th day it had started to nibble at hay and grass. At five weeks it ate well from hay and a mixture of rolled oats, bran and pellets, but it still did not drink any water. It was not seen drinking water until it was  $3\frac{1}{2}$  months old.

By the 39th day on 8 August the calf weighed 80 kg, on 20 August it weighed 95 kg, on 30 September 137 kg, and on 27 October 163 kg. During the first four months the average daily weight increase was 1 kg. After four months the daily weight increase was about 1.250 kg. On 30 November the calf weighed 205.5 kg.

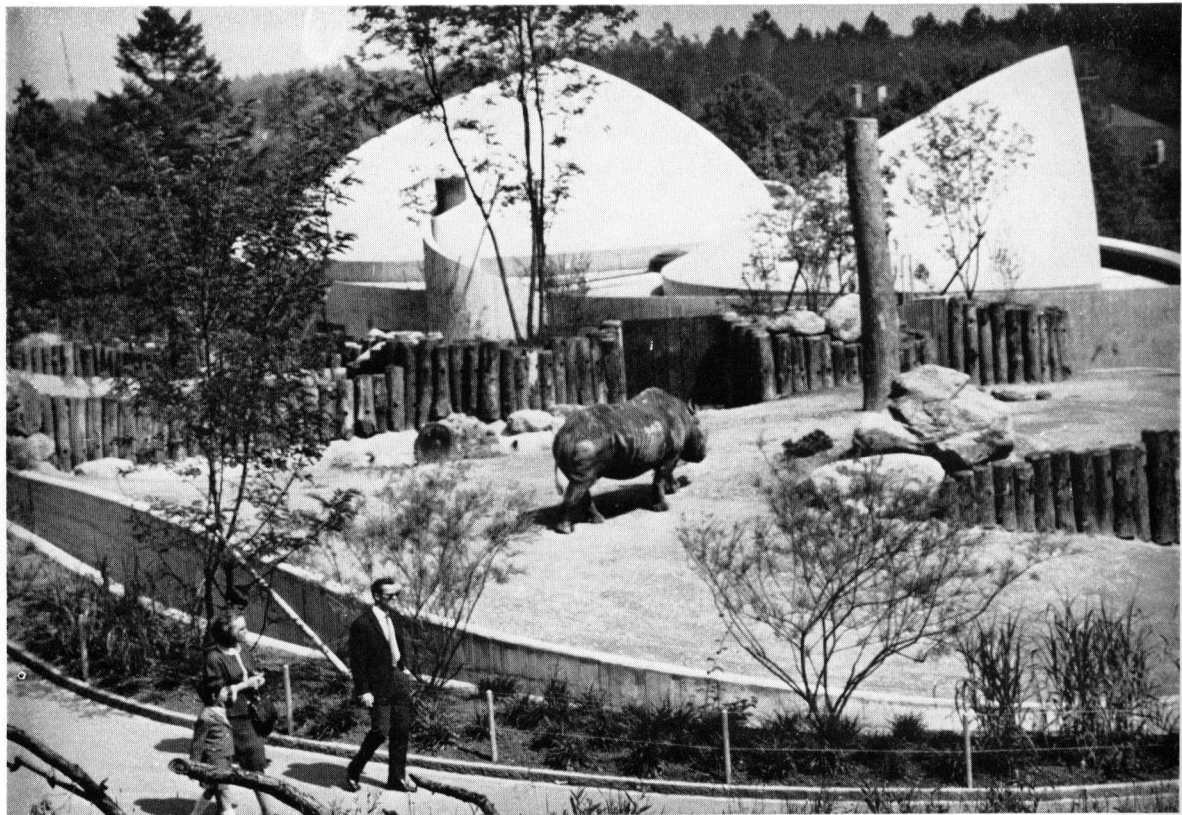
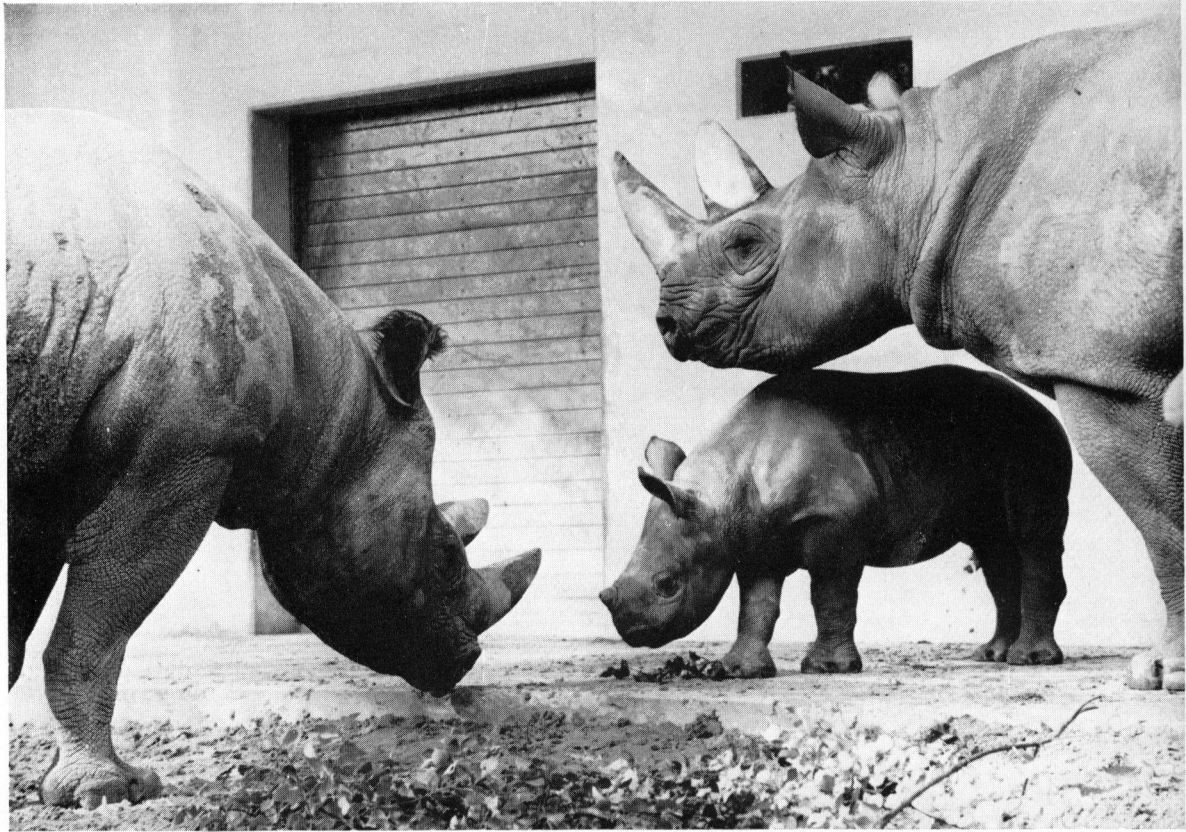
On the third day the baby measured 43 cm at the shoulder, at four months it measured 83 cm and at eight months 98 cm. At four months the body length (without the tail) was 145 cm and at eight months 178 cm. At eight months the tail was 45 cm long.

Immediately after the birth the first horn consisted of a tiny thickening of the skin in the middle of the horny plate. At four months it measured 4 cm long, at eight months 7.5 cm long. Immediately after the birth the second horn was no more than a depression in the surrounding skin. At five months there was a horny thickening in the middle, at six months it had grown 1 cm, and at eight months 3 cm.

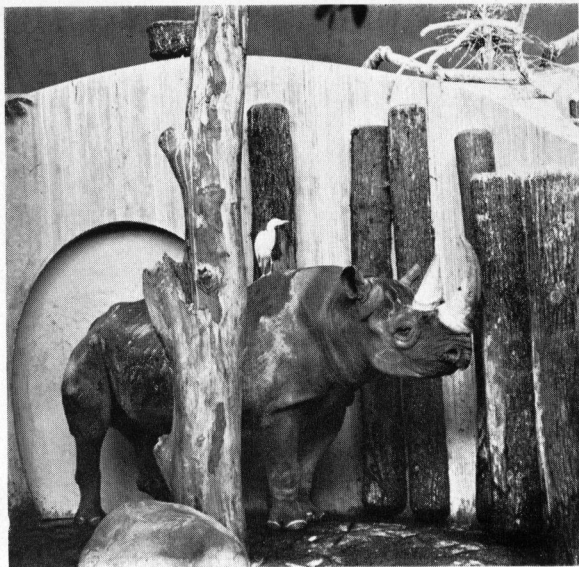
The mother usually fed the baby standing but occasionally when she was lying down. The baby followed her as soon as she moved, although she did not call to it. Until its 33rd day the baby did not make a sound. On the 33rd day it was heard squeaking like adult rhinos, only softer. The mother never licked the calf and did not even lick the perineal area or eat the droppings or urine as some other ungulate females do.

From the third day of its life the calf was able to gallop, its tail erect. It listened to noises, turning its ears in the direction of the noise. At the age of one week it playfully attacked the keeper and pushed him. The mother seldom played with the baby. Only when the male was returned to the enclosure after three months did the playing behaviour become more intensive. The male took part in pushing and chasing games. At the age of three weeks the calf wallowed in the mud, covered its faeces with earth as rhinos do, and ate mud, sand and its mother's faeces.

Post-partum oestrus occurred 20 days after the birth and only lasted 1-1 $\frac{1}{2}$  days. Regular oestrous cycles were not observed until nine months after the birth (though they may have occurred earlier than this). Copulation did not take place as the male was too preoccupied with the calf and later the nine-month-old calf was always getting in the way and preventing successful mating. The adult pair finally copulated on 19 April 1966. The young male calf has been sent to Bristol Zoo.

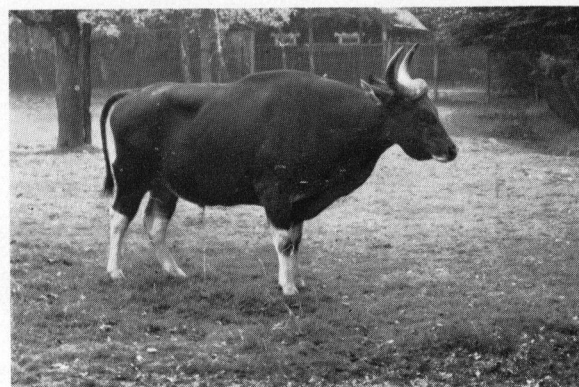


44. *top left.* On 28 June 1965 a male Black rhinoceros *Diceros bicornis* was born at Hanover Zoo after a gestation period of 469 days (see p. 161). In the photograph the four-month-old rhinoceros invites its father to play. Note the young rhino's horn, 4 cm long. The young rhino has since gone to Bristol Zoo.  
*Zoologischer Garten Hannover*



45. *bottom left.* The new Africa House for rhinoceroses and hippopotamuses at Zurich Zoo (see pp. 62-66). Accommodation is provided for three Black rhinoceroses *Diceros bicornis*, two White rhinoceroses *D. simus*, and three hippopotamuses *Hippopotamus amphibius*. The dry moat is 1.8 m deep and 2 m wide.  
*Jurg Klages Zurich*

46. *top right.* A corner of one of the indoor rhino dens in the new Africa House at Zurich Zoo. Instead of being bare cages, the dens are made to appear as 'natural' as possible, with tree trunks for the rhinos to rub their horns on and a slightly undulating floor. About 20 Cattle egrets *Bubulcus ibis* fly free inside the house and often sit on the backs of the rhinos as they do in the wild. Two of the Cattle egrets' nests can be seen at the top of the photograph.  
*Jurg Klages Zurich*



47. *centre right.* A typical pure-bred banteng bull *Bos javanicus*. The banteng is a species whose existence in the wild may soon be endangered: the number living in Java is less than 300 and there are about 30 in Malaya (data for Indo-China and Burma are unavailable). The species flourishes in zoos, given certain conditions (see pp. 222-223), and it may well be saved from extinction by being bred in captivity.  
*A. C. V. van Bommel*

48. *below.* Female banteng cow and calf at Rotterdam Zoo. Some banteng in captivity have domestic Bali cattle blood. However, the animals in Plates 47 and 48 are typical pure-bred banteng. The pure banteng bull is nearly black with a white rump patch, while the cow is red with the same white rump patch. Both sexes have white legs, though the legs of calves may be brown. The head is long, there is a marked constriction of the neck directly behind the head, the dewlap never reaches the throat and the shoulders are always higher than the rump.  
*Int. Photopress Office Rotterdam*

