



In her last years Nabire lived with the Southern white rhinoceros bull Natal

## Northern White Rhino in human care

### Michael Amend

On November 22, 2015, the 41-year-old "Nola" was euthanized at the San Diego Zoo Safari Park (formerly San Diego Wild Animal Park), she was the last Northern white rhinoceros that lived outside Africa and was the last animal in this zoo. Increasing age problems and arthrosis made this step unavoidable. With only three animals remaining in the Ol Pejeta Reserve in Kenya, the Northern white rhino (*Ceratotherium simum cottoni*) is the world's rarest mammalian species, which has been eradicated in the wild since 2008, as none of the four animals still registered in the Congo have been sighted since 2007.

The Northern white rhino was discovered in the Belgian Congo only in 1907 and scientifically described in 1908 from a skull by Richard Lydekker. Lydekker, an English naturalist and paleontologist, had received this skull from Percy Powell-Cotton, a discoverer, African traveler and hunter, whose Powell Cotton Museum, founded in Kent, is famous for its numerous collections of African large-sized mammals, including a Northern white rhino. The new rhino subspecies was named *Cottoni* in Cotton's honor. At this time the animals were still common in their area of distribution: Chad, Sudan, Uganda, the Congo and the Central African Republic. But the uncontrolled sport hunting and later the illegal poaching caused the stocks to melt quickly. In 1960, there were only 2.250 Northern white rhinos left in the Congo, Uganda, South Sudan and the Central African Republic. The civil war in the Congo brought down the population of 1,000 animals to only 100. The increase in poaching in these countries led to a rapidly increasing population decline. In only 10 years, three-quarters of the entire population was killed. In 1970, there were only 700 Northern white rhinos. In 1989 there were only 15 animals plus 11 specimens in zoological gardens.



*Ceratotherium simum cottoni* is hardly distinguishable from the southern form *Ceratotherium simum simum*. In general, the slightly shorter and more compact skull bones, as well as the more hairy ear tips, are the only features that make the two forms distinguishable. With regard to the skull, however, identification is only possible in a direct comparison between the two species. The hairiness of the ear tips is a feature which is different in each individual of the two



forms and can therefore not be regarded reliably as a distinguishing criterion, which can be clearly seen in the photographs. In the case of Southern white rhino, there are, as in the case of other rhinoceroses, animals with strongly hairy ear-rims, while, on the other hand, there are Northern white rhino whose ear-rims are not more hairy than those of the Southern Form. This was also the case for some animals in Dvur Kralove. In the cow "Nabire", the ear tips were provided with very long hair tufts, which made them different from her partner, a Southern white rhino bull. (Nabire pictured left and on previous page. But "Angalifu", below, had short ear tufts).

#### Zoo keeping

Between 1949 and 2015, 26 Northern white rhinos were kept in 14 zoological gardens, of which only four were born and reared in the zoo. The mother of three of these calves, one of only two cows that reproduced, gave birth to a hybrid calf in November 1977 in Dvur Kralove, which had been sired by the South-

ern white rhino bull "Arthur" at the Knowsley Safari Park in Prescot, England. It was the only hybrid of both subspecies. This female calf, "Nasi", was raised by the first-born mother and died in 2007 in Dvur.

Rhinoceroses have been kept in zoological gardens since the mid-1830s. They were the two Asian types of rhinos, the Great Indian rhino and the Sumatran rhino, that entered the Zoological Gardens as the first rhino species on display. The first African rhinoceros, which was shown in a zoo, was the Black rhino bull "Theodore" in the London Zoo in 1868. This species replaced the Indian rhino as a show animal which, from the beginning of the 20th century, increasingly disappeared from the zoological gardens. Although the Bronx Zoo in New York was already trying to import White rhinos in 1911, it was not until 1946 that the Pretoria Zoo was able to acquire an animal of the Southern subspecies. The first Northern white rhino came to a zoo three years later, also in Africa. On January 17, 1949, the zoo of the Sudanese capital of Khartoum received a two-month-old calf of unknown sex, which had been trapped in South Sudan and sent to Khartoum. It was probably intended for export (Rookmaker, 1998). Unfortunately, it was not possible to raise the animal; it fell to an enteritis only 12 days later. In the following year, the first pair of white rhinos entered a European zoo. On April 7, 1950, the Antwerp Zoo was able to import a young pair of Northern white rhinos from Uganda, the two almost 2-year-old animals who used a former sheltered accommodation opposite the Egyptian temple, were named "Paul" and "Chloe". In the 1970s, the relatively





small exhibit was subdivided in time, in order to be able to accommodate a pair of Indian rhinos, which later transferred to the Dierenpark Plankendael. "Paul" died on 13th April 1968 and the cow on 7th August 1985 at the age of 37 years. As a substitute for "Paul", the zoo had received the Southern white rhino bull "Baltasar" from Planckendael in 1978. This was the first White rhino who had been born under Human care at the Pretoria Zoo in October 1969 and lived in Belgium since 1974. The Antwerp Zoo ended its keeping of rhinoceros in 1995 and gave the bull to Safari Park Beekse Bergen, where he died in 2003.

The London Zoo had a long tradition in the keeping of rhinoceroses. It is the only zoo in the world that has succeeded in showing all five rhino species, Sumatran and White rhino even in both of the two subspecies, and one of only two facilities that could show four species at the same time. London held Javan, both subspecies of Sumatran rhinoceros, Indian rhino, and Black rhino; the White Oak Conservation Center in Yulee, Florida - instead of Java rhinoceros - kept Southern white rhinos. In the meantime, the welfare of the Sumatra rhinoceros has been terminated there - this last animal outside Asia, the bull "Harapan", now lives, like his older brother "Andalas", in the breeding facility Way Kambas on Sumatra. In 1955, London zoo imported a pair of *Cottoni* from Uganda, "Ben" and "Bebe." Since before the Second World War, there was no longer a pachyderm house at the zoo, so the rhinoceros were lodged in the Deer and Cattle House. The cow "Bebe" died after only 9 years in May 1964, so only "Ben" moved into the new elephant and rhino house, opened in 1965. As a new partner, he got the Southern white rhino cow "Mashobeni". In 1966 the Zoo acquired a pair of Black rhinos and had now both African rhino species on display. While the Black rhinoceros were bred from 1969 onwards, the white rhinos unfortunately never produced any offspring. That the social white rhino did not breed when kept only in pairs (there were exceptions, for example, in Copenhagen and Munster later) was not yet known at that time. In 1986 the London Zoo ended the keeping of White rhinos, since the species has been bred regularly at Whipsnade since the 1970s. The bull was sent, on 27th August 1986, to the Zoo Dvur Kralove, where he died four years later, the cow moved to Glasgow Zoo.

The first white rhinos in the USA were also *Cottoni*. On September 4, 1956, the National Zoo Washington received the pair "Bill" and "Lucy" from the Sudan, which they donated to the new San Diego Wild Animal Park in 1972. In 1957, the Saint Louis Zoo had also imported 1.1 Northern white rhinos from the Sudan, thus complementing its extensive stock of pachyderms with a third species of rhinoceros, housed together with African and Asian elephants, hippos, pygmy hippos and two species of tapirs in the huge pachyderm building, which opened in 1957. This pair, the bull "Dinka" and the cow "Joyce", was delivered to San Diego in August 1972 to establish a breeding group, but the starting base of 3.1 was unfavorable to build up a stock. For three years, between November 1979 and October 1982, "Dinka" was kept in the San Diego Zoo and then transported back to the Wild Animal Park. The San Diego Wild Animal Park, which has been called "San Diego Zoo Safaripark" since some years, became the most successful breeding facility for Southern white rhinos in the world; more than 100 calves have been born there, but unfortunately it was not possible to build a breeding group with the four *Cottoni*. The bull "Saut" and the two cows "Nola" and "Nadi", as well as the bull "Angalifu", which was taken over from Khartoum in 1990, did not succeed in the breeding of animals from Dvur Kralove. In 2007 "Nadi" died, 2014 "Angalifu" died. and in November 2015 "Nola" followed him.

The first white rhino in Germany, and at the same time the only one of the Northern subspecies, was the bull "Gus", which arrived at Hannover Zoo on June 4, 1963. The animal had already lived in Kenya for a few years at the livestock holding of the animal catcher Tom Carr-Hartley, until he sold this magnificent bull - with his striking, long fore-horn - to Herman Ruhe, who kept the impressive animal at Hannover Zoo. "Gus" was completely tame, and allowed his keeper to sit down on him and ride him. On September 3, 1964, "Gus" was sold to the Southampton Zoo, which was run by the circus and safari park operator Jimmy Chipperfield. "Gus" stayed there only three years, he was sold in 1967 to the Lion Country





Gus at Southampton Zoo. *Top left:* metal welding of gates shortly after his arrival August 1964; *centre left:* being brushed by Zoo manager Bill Stokes, *below:* the whole of the enclosure.  
*Photos: John Adams*





Safari Park in West Palm Beach in Florida. As is usual with elephants, "Gus", with an alleged weight of 3.5 tons, was advertised as the largest White rhino in human care - which is, of course, completely exaggerated - even the largest white rhino is hardly more heavy than 2.5 tons. In Florida "Gus" was held together with Southern white rhino cows, but there was no breeding. Although the bull was relatively easy to handle, there was still an accident in August 1973, in which the German keeper, Werner Andres, was attacked and injured by "Gus". Andres has been trying to separate the bull from a second animal, which was probably a cow. An exact date of death of "Gus" was not handed down, he was supposed to have died around 1979. In the *International Studbook for White Rhinos*, he is still registered under the number 1693 as Southern white rhino, his last location is not listed there. Also the cow "Nasima" is listed under the number 351 as Southern white rhino, although she was a *Cottoni*. Between 1964 and 1973, the Khartoum Zoo captured three pairs of Northern white rhino. They sold a couple to the Zoo Riyadh, and a bull to the Zoo Al Ain, the rest were kept the zoo itself. The last remaining animal, the bull "Angalifu", was sent to San Diego in 1990, where all efforts have been made to move the animals to breeding. For the Southern white rhino, the Wild Animal Park succeeded very well. The park is also the world's most successful Indian Rhino breeding facility, with more than 70 calves born there.

In 1972 the Knowsley Safari Park received 3.4 white rhino, including a *Cottoni* cow named "Twink", which was mated in 1976 by the Simum bull "Arthur". In August 1977 she was handed over to the Zoo Dvur Kralove, which imported six Northern white rhino in 1975, two bulls and four cows. In Dvur the cow was renamed "Nasima". In the Czech Dvur, the prospects were now good to breed this subspecies as well, after the zoo had already bred Black rhino and Southern white rhino. Their chances were improved in 1980 with the donation of the last animals of the Northern subspecies in Europe, after which Dvur Kralove was wrongly intercepted by some zoos to cross both subspecies.

For this purpose, the two *Cottoni*, still in England, were sent to Dvur. But the London bull "Ben" was already very old and had to be euthanized in 1990. However "Nasima", from the Knowsley Safari Park, still had breeding potential and her gift, the hybrid calf which had been born healthy in November 1977, had been routinely reared by her. She was successfully mated with the bull "Saut", and after a gestation period of 503 days, on the 8th of June 1980 she gave birth to the first pure Northern white rhino, bred in human care. "Suni" was the 5th white rhino born and raised in Dvur, including the hybrid calf. "Suni" grew up well and still lives, followed on 15 November 1983 by "Nabire" the second, female calf, father this time was "Sudan", who was also the father of the third cow calf "Najin" born on 11 July 1989. This calf increased the stock of Northern white rhino in Dvur Kralove to 3.6.

Nadi, pictured right, lived from 1968 until her death in 2007 at the San Diego Wild Animal Park





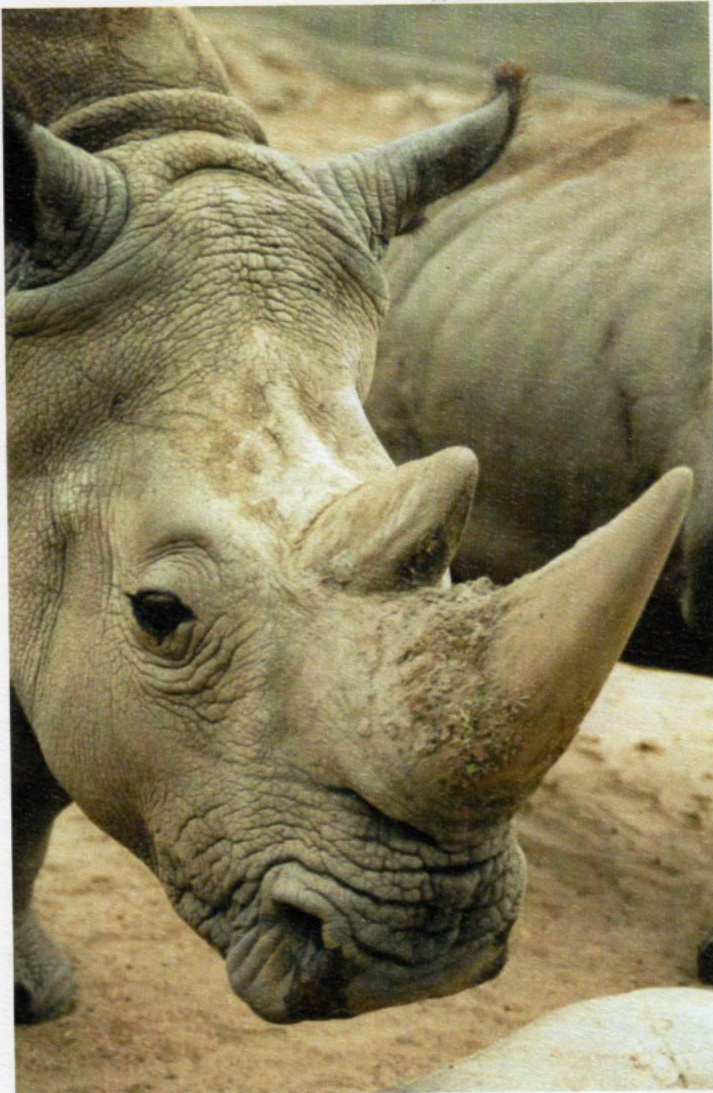
In order to increase the breeding base in San Diego and not to jeopardize the population by keeping in one place, on the 14th of October 1989 the bull "Saut" and the two cows "Nola" and "Nadi" were sent to the San Diego Wild Animal Park, where only the two bulls "Dinka" and "Angalifu" were left after the death of the Washington pair. In the year-round warm climate of Southern California, the animals can be kept day and night in the huge, up to 20 ha large outdoor facilities. Separated from the Southern white rhino, the *Cottoni* group, which now included five animals, was housed in the park's East African enclosure. The change of the locality and the climate, which is particularly favorable for the animals, should help to make the two cows pregnant - unfortunately unsuccessful. Unfortunately, "Nasima" in Dvur Kralove had a female premature birth in 1991 after 296 days of gestation and, on 26 August 1992, she died unexpectedly from shock. The loss of the only breeding cow naturally hit the zoo hard. In 1998 the bull returned from San Diego to Dvur Kralove, while the two cows remained in San Diego. Hardly back in Dvur, "Saut" began to be interested in the young cow "Najin" who had been just 4 months old when he was delivered to San Diego. On March 5, 1999, he successfully mated with the cow, and after 482 days of waiting, "Najin" gave birth to the "Millenium Baby" of the zoo Davur Kralove on 29th June 2000. The fourth and, at the same time, the last Northern white rhino, which was born in human care. The cow calf was named "Fatu" and fortunately was accepted immediately by her mother and reared. After the cow had been integrated into the group with the calf, she was sired again by "Saut", but she did not become pregnant. In order to determine the cause, an investigation by the veterinary team of the IZW Berlin was carried out in 2004. However, this did not provide any reason why the animal was no longer conceiving. It was also possible to confirm the full fertility capacity of the bull. While "Saut" continued to be kept together with "Njin" and regularly mating with her, the young bull "Suni" was kept together with the other cows, but there were only some mating attempts only with "Fatu". After a pregnancy with "Najin" failed, because they only had an irregular cycle, the 7 animals were split into two groups, "Saut" was given the cows "Najin", "Nabire" and the hybrid cow "Nasi" Suni "the cows" Fatu "and" Nesari ". In 2006 the first attempt was made to fertilize "Fatu" with semen from "Saut". As a result, semen was also taken from "Suni". Both bulls did several mating attempts to different cows, but without success. A second insemination of "Fatu" and for the first time "Najin", in August of the same year and again in May and June 2007, did not lead to any pregnancy. Last attempts, both with artificial insemination as well as the natural way, were undertaken in May 2008 - again with the same, frustrating result.



**Nola at the San Diego Wild Animal Park was the last Northern white rhinoceros outside of Africa. She was euthanized in 2015**



"Saut" died from heart failure on August 14 2006, and "Nadi" died on May 3, 2007 in San Diego and, in Dvur, the hybrid cow "Nasi" died on the 20th of June of the same year. So there was only a non-breeding pair in San Diego and the six animals in Dvur, two bulls and four cows. As a last chance to breed with the animals, the "Northern White Rhino Conservation Project" was initiated with the aim of transferring the still breeding animals from the Zoo Dvur Kralove into a strictly guarded protected area in Africa. After a new semen collection of the bull "Suni", the bulls "Sudan" and "Suni" as well as the two cows "Najin" and "Fatu" were flown to Kenya on 19 December 2009 to give them a new home in the Ol Pejeta protected area. In Dvur, only the two cows "Nabire" and "Nesari", remained. "Nesari" died on May 26, 2011. After her death "Nabire" could be socialized with a Southern white rhino, and she did very well with him. "Nabire" died on July 27, 2015, as the last Northern white rhino in Europe, and the penultimate of the subspecies outside of Africa. After her death, her healthy ovaries were taken and sent to a laboratory in Italy. The bull "Angalifu", (pictured below at the Wild Animal Park) who had lived 41 years in human care, died in San Diego in December 2014. After the death of the bull "Suni" on October 17, 2014, he was the first Northern white born and raised in human care and



the last one in a zoo, the bull "Sudan", as well as the two cows "Najin" and "Fatu" still remain in Ol Pejeta. They are now the last surviving Northern white rhino in the world. Thus, as with the Sumatran rhino, also with the Northern white rhino the attempt to build an ex-situ population failed miserably. The parallels between the two projects are obvious. The founder population of both species was too small from the beginning, so the losses could not be compensated for; since wild catches could not be used again, and the rearing rate was too low, 3 calves for the Sumatran Rhino, 4 for the Northern white rhino. Only a few animals of both species were introduced to the breed; with the Sumatran Rhino, it was only a pair; and for the Northern white rhino it was 2.2. And, like the Sumatran rhino, the last attempt to preserve the species is on the ground, so in-situ. Fortunately, the second calf of Sumatran rhino is already growing at Way Kambas. For the Northern white rhino, the chance of natural reproduction is no longer possible. So far, all experiments failed to breed with artificial insemination with the three remaining animals. At present, new methods of reproduction are being discussed, including egg

transfer and modern stem cell technology, which is to convert induced, pluripotent stem cells, or IPS, to germ cell seeds, ova and egg cells. For this purpose, both skin, but also the germ cells, of the three still living animals could be used. The thus fertilized egg cells would then be implanted in Southern white rhino. If this really works out as the scientists imagine, remains to be seen. The Japanese stem cell researcher Katsuhiko Hayashi succeeded in cultivating mice, but will this method also works with rhinoceroses?



The five rhino species are facing extinction because of their demand for useless medicines and potency preparations. Only a maximum of 50 Javan and 75 Sumatran rhino still live in this world, and the stocks of Indian, Black and Southern white rhino are also rapidly declining. In today's world, where trade in live animals and animal products is already more lucrative than dealing with drug trafficking and at lower risk and penalties, the gloomy prospects are not only for rhinoceroses whose horn is weighed with gold. The rhinoceros can only have a real chance if the cause of their extermination is terminated - but how do you fight the aftermath after the news was going around the world in 2009 that grated nose horn could be a cure for cancer? Now everything must be done to protect the last rhinoceros so that the Javan and the Sumatran rhino will not soon share the fate of the Northern white rhino.

### Northern white rhinoceros in Zoological gardens

No.	Sex	name	arrival	died
1	?	?	17 January 1949, Khartoum	29 January 1949
2	1.0	Paul	1950 Antwerp	1968
3	0.1	Chloe	1950 Antwerp	1985
4	1.0	Ben	1955 London	
			1986 Dvur Kralove	1990
5	0.1	Debe	1955 London	1964
6	1.0	Bill	1956 Washington	
			1972 San Diego WAP	1975
7	1.0	Dinka	1957 Saint Louis Zoo	
			1972 San Diego WAP	
			1980 San Diego Zoo	
			1982 San Diego WAP	1991
8	0.1	Joyce	1957 Saint Louis Zoo	
			1972 San Diego WAP	1974
9	1.0	Gus	1963 Hannover	
			1964 Southampton	
			1967 Lion Country Safari	ca. 1979
10	0.1	?	1964 Khartoum	1967
11	1.0	?	1964 Khartoum	
			1965 Riyadh	1985
12	0.1		1964 Khartoum	
			1965 Riyadh	1985
13	1.0	?	1970 Khartoum	1978
14	0.1	Tofacha	1972 Khartoum	
			1973 Al Ain	1978
15	1.0	Angalifu	1973 Khartoum	
			1990 San Diego WAP	2014
16	0.1	Nasima	1971 Knowsley Safari Park	
			1977 Dvur Kralove	1992
17	1.0	Saut	1975 Dvur Kralove	
			1989 San Diego WAP	
			1998 Dvur Kralove	2006
18	1.0	Sudan	1975 Dvur Kralove	
			2009 Ol Pejeta, Kenya	
19	0.1	Nuri	1975 Dvur Kralove	1982
20	0.1	Nesari	1975 Dvur Kralove	2011
21	0.1	Nola	1975 Dvur Kralove	
			1989 San Diego WAP	2015
22	0.1	Nadi	1975 Dvur Kralove	
			1989 San Diego WAP	2007
23	1.0	Suni NZ	*1980 Dvur Kralove	
			2009 Ol Pejeta, Kenya	2014
24	0.1	Nabire NZ	*1983 Dvur Kralove	2015
25	0.1	Najjin NZ	*1989 Dvur Kralove	
			2009 Ol Pejeta, Kenya	
26	0.1	Fatu NZ	*2000 Dvur Kralove	
			2009 Ol Pejeta, Kenya	

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