Zool. Garten N. F. 67 (1997) 1/2, S. 53–60

DER ZOOLOGISCHE GARTEN

Gustav Fischer Verlag
Jena · Stuttgart · New York

Captive Rhinoceros Reproduction at the Zoological Society of San Diego: A Conservation Success Story[1]

By Lawrence E. Killmar, San Diego

With 5 Figures

Received 15 November 1996

Of the five species and subspecies of *Rhinocerotidae* housed at the Zoological Society of San Diego's two facilities, the San Diego Zoo and the San Diego Wild Animal Park, four of these have reproduced successfully.

The most successful, by far, is the Southern White Rhinoceros (*Ceratotherium simum simum*). The first specimens received at the San Diego Zoo on September 8, 1962, were a male and a female from the Umfolozi Game Reserve located in Natal, Republic of South Africa. Both animals lived together at the San Diego Zoo until the male, "*Mandhla*", was moved to the San Diego Wild Animal Park on May 11, 1971. On August 24, 1971, the female, "*Tombasan*", was also moved to the San Diego Wild Animal Park. These two animals joined 5 ♂♂ and 13 ♀♀ that were imported from the Natal Parks Board on February 17, 1971. The original shipment consisted of 6 ♂♂ and 14 ♀♀; however, a pair of animals died within four days of arrival at the San Diego Wild Animal Park, due to the rigors of a forty-plus day transport from South Africa.

All 20 rhinos were housed in a 36 hectare exhibit, consisting of rolling hills dotted with native California trees. All the animals were housed together continually throughout the year, and not separated unless there was need for medical care. With few exceptions, the dams gave birth within the exhibit, and were not isolated from the herd in a holding area.

The first birth of a Southern White Rhinoceros, a male, occurred on October 11, 1972 (fig. 1). The calf was named "*Zibulo*" (meaning "first fruit of man" in Swahili). This animal was sired by "*Mandhla*" Studbook #52, and his dam was "*Uhtandu*" Studbook #151. During the next 13 years, "*Mandhla*" sired an additional 58 calves. This breeding success without question established the San Diego Wild Animal Park as the leader in Southern White Rhinoceros captive reproduction.

---

[1] This paper is dedicated to Dr. James M. Dolan, Jr., for his vision and dedication to the conservation of the planet's wildlife on his 60th birthday.

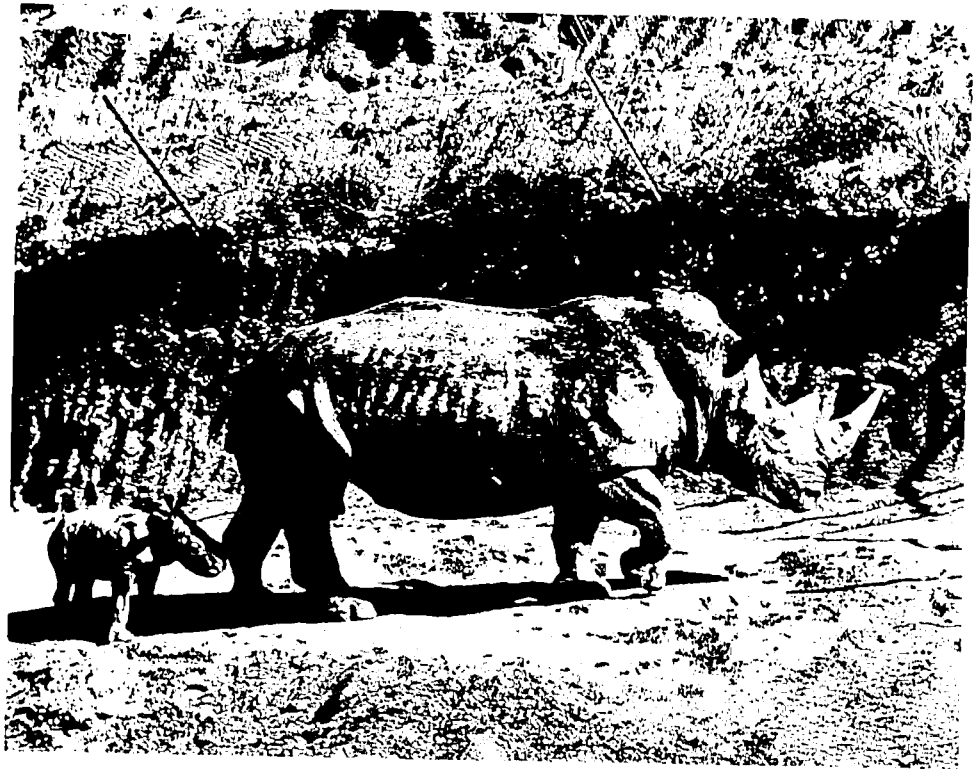

Fig. 1. Southern White Rhinoceros (*Ceratotherium simum simum*) ♂ 1st birth "*Zibulo*"

A point of interest is that the female "*Tombasan*", who was originally housed with "*Mandhla*" at the San Diego Zoo, never reproduced during her stay in San Diego. She was eventually sent to the dealer LEON LEOPARD on June 22, 1976. It was never determined if this female reproduced after she left the Zoological Society of San Diego.

"*Mandhla*" was eventually shipped to International Animal Exchange on October 27, 1983, and died on January 10, 1984.

From 1985 to the present, two additional males have sired calves at the San Diego Wild Animal Park. On August 19, 1996, the 82nd Southern White Rhinoceros calf was born at the San Diego Wild Animal Park (fig. 2). While the reproductive rate has slowed down over the years due to changes in sire, there is little doubt that in the near future the Zoological Society of San Diego, and particularly the San Diego Wild Animal Park, will be celebrating its 100th birth of Southern White Rhinoceros. A significant fact is that out of the original imported females, one female has had thirteen calves since her arrival. One female has given birth twelve times and three females have produced calves nine times since their arrival. While it is difficult to substantiate that these are captive breeding records for the most calves reproduced by a single female, they most certainly represent a significant achievement in that area.

Fig. 2. Southern White Rhinoceros, ♂ 82nd birth August 19, 1996. Photo: RON GARRISON

The second most reproductively successful rhinoceros species is the Great Indian or Greater One-Horned Rhinoceros (*Rhinoceros unicornis*). The first specimen received at the San Diego Zoo was a male named "*Lasai*", Studbook #29, who was born on August 31, 1962, and was received from the Basel Zoo on October 12, 1963. He was subsequently moved to the San Diego Wild Animal Park on April 19, 1972. The second specimen received was a female named "*Jaypuri*", Studbook #26. She arrived at the San Diego Zoo on February 28, 1965 from the dealer GEORGE MUNRO. She was born in captivity in Gauhati, Assam, on July 10, 1963. "*Jaypuri*" was also moved to the San Diego Wild Animal Park on April 26, 1972 to join "*Lasai*". These two animals were the breeding nucleus for the San Diego Wild Animal Park Great Indian Rhinoceros herd.

The Indian Rhinoceros are housed in a 23.2 hectare mixed-species exhibit, similar in design to the exhibit of the Southern White Rhinoceros. These animals, however, are separated prior to parturition to prevent any possible aggression from the other herd members. Dam and calf remain separated for several weeks before reintroduction.

The first Great Indian Rhinoceros birth, a male, occurred on March 24, 1975. He only survived one day. The second birth, also a male, occurred on October 18, 1976; he also did not survive beyond the second day. After this dismal and discouraging

beginning, things improved with the third birth, which proved to be successful. On March 19, 1978, a female named "*Gainda*" (meaning "rhinoceros" in Hindi) was born (fig. 3). This animal has had six calves since, and as of this publication is still reproductively active.

In total, the original pair of Greater One-Horned Rhinoceros produced nine offspring over a 19 year period. During the 24 years that this species has been exhibited at the San Diego Wild Animal Park, we have had two ♂♂ and four ♀♀ regularly breeding; these animals are responsible for 23 offspring. These reproductive successes, for the most part, are due to two individuals of this species. To date, the San Diego Wild Animal Park is the only facility in North America to regularly breed this species.

The East African Black Rhinoceros (*Diceros bicornis michaeli*) is the third most reproductively successful member of the *Rhinocerotidae* family. The first specimen, a male, Studbook #110, was received at the San Diego Wild Animal Park from the National Zoological Park in Washington, D.C., on April 8, 1970. He was born at the National Zoo on July 31, 1967. The second specimen, a female, was received February 10, 1972, from the Los Angeles Zoo, where she was born on August 27, 1971. Another female, Studbook #188, arrived on September 30, 1972, via International Animal Exchange. Her country of origin was Kenya; she was approximately $2^1/_2$ years of age when she arrived in San Diego. The second female, Studbook #188,

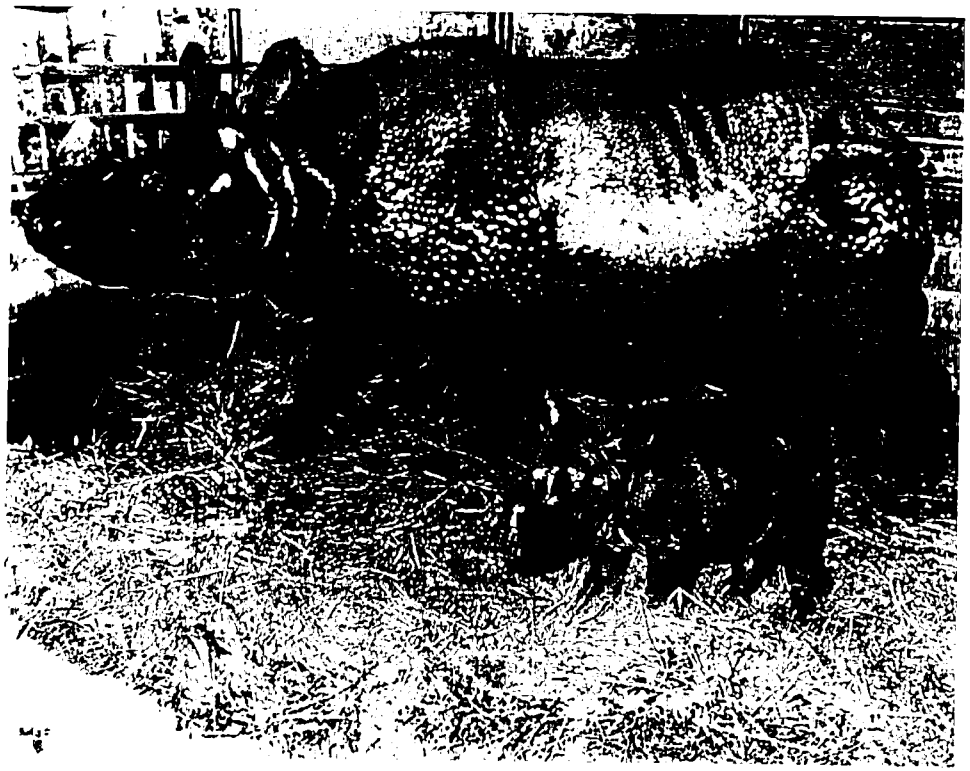

Fig. 3. ♀ Greater One-horned Rhinoceros (*Rhinoceros unicornis*) "*Gainda*". Photo: F. D. Schmidt

and the original male, Studbook #110, produced a female calf on October 15, 1976, Studbook #239. This was the first birth of a Black Rhinoceros in the history of the Zoological Society of San Diego. The animal lived until June 13, 1991 (fig. 4).

The East African Black Rhinoceros were first housed in a 50 hectare exhibit consisting of a 2 hectare pond, rolling hills and several large native California trees. The herd was then moved to a .8 hectare exhibit in 1989 to make room for the arrival of the Northern White Rhinoceros (*Ceratotherium simum cottoni*). As with Great Indian Rhinoceros, the dam is always separated pending birth, and is reintroduced to the main herd after several weeks.

The next birth, a female, Studbook #377, did not occur until July 12, 1987. She was sired by a male received from the Cincinnati Zoo on September 28, 1981. This male, Studbook #302, was born at the Cincinnati Zoo on August 7, 1980. The dam was the first Black Rhinoceros born at the Zoological Society of San Diego, Studbook #239. Though we had little success in the beginning, this species has been reproducing with some regularity since 1987. As of this publication, there have been eight recorded births at the San Diego Wild Animal Park.

The South African Black Rhinoceros (*Diceros bicornis minor*) represents the fourth subspecies to successfully reproduce at the Zoological Society of San Diego.

Fig. 4. East African Black Rhinoceros (*Diceros bicornis michaeli*) ♀ born October 15, 1976. Photo: Ron Garrison

he first specimen, a male, was received from the Natal Parks Board on the th of December, 1987. This was a wild-caught specimen from the Hluhluwe eserve. The second specimen, also wild-caught, was received on July 18, 1989, from imbabwe.

The first birth of a South African Black Rhinoceros occurred on August 12, 1993, the San Diego Zoo. It was a male. This animal was eventually sent to the Western ains Zoo, Dubbo, New South Wales, Australia, on November 27, 1994, in accordıce with the recommendation of the Black Rhinoceros Species Survival Plan to supırt the Black Rhino captive population in Australia. The second birth was, ıfortunately, a stillbirth. This took place on December 16, 1995. The calf died inero during the second trimester.

These animals are presently housed in a 533 sq. meter exhibit. The exhibit is not ılike most traditional zoo exhibits, with a combination moat and cable fence barr. Animals are housed off-exhibit during the night. The female is separated from e male prior to giving birth; the dam and calf are housed separately for several ınths before reintroduction to the male is attempted.

The remaining species is the Northern White Rhinoceros (*Ceratotherium simum ttoni*). Although this species has not reproduced to date, the reproductive analysis nducted by the Center for Reproduction of Endangered Species of the Zoological ciety of San Diego has answered several questions as to why breeding may not ve occurred, and provided possible solutions to these problems.

The Northern White Rhino collection at the San Diego Wild Animal Park began 1972 with the acquisition of four animals: male Studbook #27 and female Studok #28 on April 22, 1972, on loan from the National Zoological Park in Washing-ı, D.C.; and male Studbook #74 and female Studbook #75 on August 7, 1972, from St. Louis Zoological Park in St. Louis, Missouri. All four animals were wildıght in the Sudan, with estimated birth dates of 1952 and 1957. These animals re never observed breeding during their stay at the San Diego Wild Animal Park. l four animals were housed in a 52 hectare mixed-species exhibit. The female Studık #75 died on August 15, 1974, followed by male Studbook #27 on May 2, 1975. e remaining two animals (Studbook #28 and Studbook #74) died on March 15, 79 and January 28, 1991, respectively. While there was hope in the beginning that se animals might breed, it was felt that due to their advanced age and general ysical condition this was not a realistic assumption.

The next specimens of Northern White Rhinoceros arrived on October 14, 1989, m Dvur Kralove Zoological Gardens. This shipment consisted of one ♂ and ♀♀, all of which were on loan to the Zoological Society of San Diego (fig. 5). male, "*Saut*", Studbook #373, and the females "*Nola*", Studbook #374, and *ıdi*", Studbook #376, were all wild-caught animals from 1972 to 1974. These anils were joined by "*Angalifu*", Studbook #348, a male received on August 12, 1990 n the Khartoum Zoo. This male was wild-caught as well, prior to April 1973. The nal was sent to the Zoological Society of San Diego on loan from the Sudanese vernment.

After numerous introduction attempts and pairings over the next several years, animals showed little interest in breeding. In July 1992, a reproductive examina- was conducted of the female "*Nola*". This exam revealed a persistent hymen. It also discovered that serum estrogen and

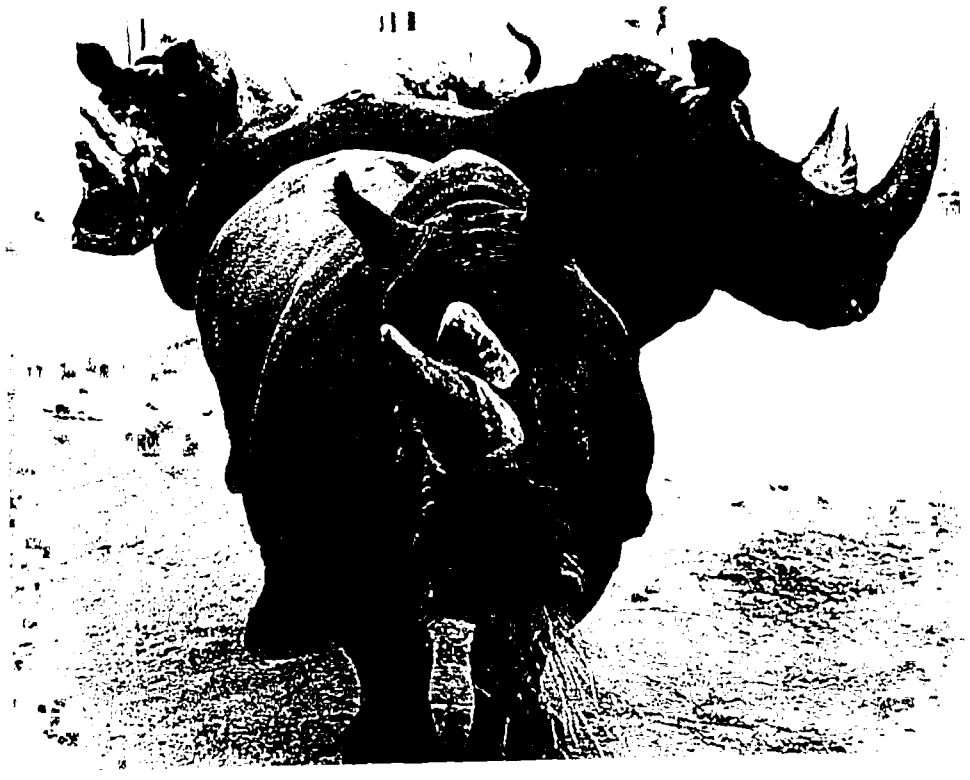

Fig. 5. ♂ ♀♀ Northern White Rhinoceros (*Ceratotherium simum cottoni*). Photo: KEN KELLEY

was no indication of either follicular or luteal function. Another exam was conducted of this same female in December 1993, during which the ultrasound revealed an inactive left ovary. In May 1994, this animal was injected with two prostaglandin injections eleven days apart. No estrus behavior was observed, however. One month later, a fourteen day Regu-Mate treatment was initiated. 24 days after the end of this treatment, "*Nola*" showed signs of estrus. However, after another treatment 41 days later, still no breeding occurred.

The other female, "*Nadi*", was given a reproductive examination in October 1992. This exam showed normal vaginal and cervical tissue with a patent hymen. As in the previous female, prostaglandin injections were administered in May 1994, followed a month later by Regu-Mate. This female also showed signs of estrus 23 days post treatment, but no breeding occurred.

Evaluations of these animals occurred for the next several months. This reproductive study was a cooperative effort between the Zoological Society of San Diego's Center for the Reproduction of Endangered Species, and the Curatorial, Veterinarian and Animal Management divisions of the San Diego Wild Animal Park. On November 2, 1995, an unexpected breeding occurred between male "*Saut*" and female "*Nola*". Two additional breedings have been observed: one on December 12, [illegible] 18, 1996. Breeding has continued to date, but on an irre-

gular cycle. The other female, "*Nadi*", has not been bred by "*Saut*", even though she shows reproductive activity on examination. The other male, "*Angalifu*", has never shown any interest in either female during this period of time.

We remain hopeful that these animals may be reproductively successful in the future. Their age and general health, however, are of increasing concern, most particularly when considering any moderate or long-term breeding success.

In conclusion, the Zoological Society of San Diego has enjoyed tremendous success in rhino reproduction. A total of 113 births have occurred in its history. There are several factors that have contributed to this success, not the least of which being the spacious exhibits at the San Diego Wild Animal Park. Other factors include the temperate, semi-arid climate of Southern California that permits us to exhibit animals nearly year round in their outdoor quarters, and the ability to house large numbers of rhinos together, thus increasing reproduction over a relatively short period of time. However, all those factors aside, the management of these species is still the single most important contributing factor. The staff of the Zoological Society of San Diego has always been willing to try new and innovative techniques, examine the traditional management philosophies to find better ways to increase reproduction and overall management of the species. While these new techniques may have been viewed by some as risky, at no time was animal health or safety compromised. The results speak for themselves, the captive breeding program of rhinos at the Zoological Society of San Diego has in fact been a true conservation success story.

LAWRENCE E. KILLMAR, Zoological Society of San Diego, P.O. Box 551, San Diego, CA 92112 (U.S.A.)

Zool. Garten N.F. 67 (1997) 1/2, S. 61–70

DER ZOOLOGISCHE GARTEN

Gustav Fischer Verlag
Jena · Stuttgart · New York

Jungle Trails: A new experience at Cincinnati Zoo and Botanical Garden[1]

By EDWARD J. MARUSKA, Cincinnati

Received 16 December 1996

With 10 Figures

The goal of this exhibit was to present Asian and African forest species in naturalistic tropical forest habitats (fig. 1, 2). The design of Jungle Trails incorporates a complex of nine seasonal outdoor exhibits with two indoor display buildings – the

Fig. 1. Entrance to exterior of the Asian Tropical Forest with man-made fallen tree, live vegetation and mist

[1] This paper is dedicated to my friend and colleague Dr. JIM DOLAN on the occasion of his sixtieth birthday.