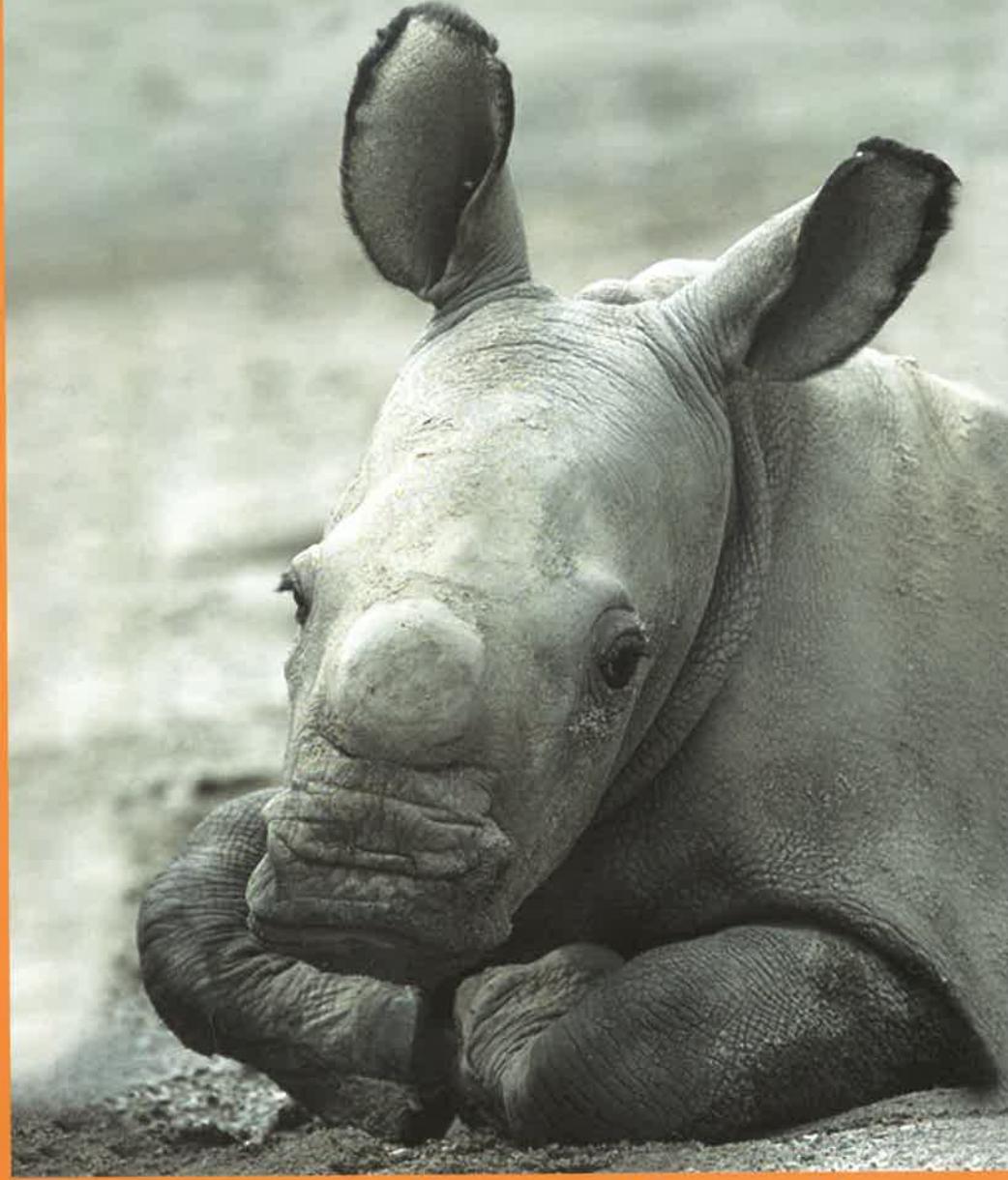


THE ENDANGERED WORLD OF RHINOS



Baby of the Millennium

DANA HOLEČKOVÁ • MIROSLAV BOBEK



Introducing Rhinos



White Rhino

Photo: Dana Holečková



Indian Rhino

Photo: Tomáš Hajný



Javan Rhino

Photo: archive



Black Rhino

Photo: Dana Holečková



Sumatran Rhino

Photo: Brent Huffman, The Ultimate Ungulate Page
(www.ultimateungulate.com)

Introduction

Watching the Andromeda Great Galaxy in the darkness of the night, one seldom realizes that due to the limited light speed we observe its image from two to three million years ago. The same goes for rhinos: we usually do not notice the fact that this ancient-appearing creature is a living evidence of the evolution and existence of its predecessors. Thirty-five million years ago Asia was inhabited by hornless rhinos – *Baluchitheria*. With their height exceeding 6 meters, body length of over 9 m and 1,5 meters long heads they were far the largest land mammals ever.

My life has granted me the opportunity to get to know rhinos not only in zoos, but also in the wild. Every day during my visits to the Kaziranga NP in Assam I met Indian rhinos and was equally impressed by them as by white rhinos in Natal's Hluhluwe reserve.

Whenever I see these fascinating animals in zoos, beautiful memories come back to my mind. I realize at the same time that zoos are the only place for rhinos to be protected from the destiny they have to encounter in the wild. Despite all the endeavor to save these endangered animal species, the hunt and poaching continues. In times of permanent political disputes and military conflicts in Africa, the increasing importance of a systematic breeding in zoos seems to give hope for the survival of rhinoceroses.

Rhinos have had a rich evolutionary history and the species that survive are part of the biodiversity heritage of our planet. We need to appreciate and conserve this heritage for its own sake and because it may be essential the survival of our own human species.

Unless we protect the diversity in animal species and develop a deeper respect towards them, the human kind will vanish like dinosaurs did. A huge part of the protection of animals is therefore carried out by zoos – not exclusively by reproduction but also by intensive education. It shall hopefully bring people, also those in media and politics, to the correct comprehension of the term ecology and make them realize that the knowledge and preservation of fauna is a part of our cultural richness.

I would like to acclaim the outstanding breeding achievements of Dvůr Králové Zoo, particularly those regarding African fauna. Obviously the birth of an extremely rare northern form of the white rhino was a result of the earlier successes and experience. One can definitely call it a success of a worldwide meaning and I am all the more enthusiastic that the birth, the maternal behavior of the dam as well as the postnatal growth of the calf could be watched live on the Internet. I believe the majority of the online observers realized what a natural miracle they were seeing and how important Zoos are – both for the reproduction and protection of animals as well as for the education of younger and older visitors.

Prague, July 21st 2000

Prof. Dr Zdeněk Veselovský, DrSc.

Peaceful herbivore giants

Rhinoceroses are at present the second-largest land mammals after elephants. Their only rivals in the size contest are hippos.

Rhinos first appeared in the Tertiary period as the *Rhinocerotoidea* group, represented by a number of remarkable forms.

The *Baluchitherium* mentioned on the previous page was a member of the rhino family but was rather different from living rhinos. *Baluchitherium* (also known as *Indricotherium* and *Paraceratherium*) was a representative of a rhino subfamily known as "indricotheres". The indricotheres were hornless and had long giraffe-like necks but much heavier bodies than modern giraffes.

This rhino was five to six meters tall in shoulder and reached vegetation up to eight meters above the ground. Its weight is estimated at 17 to 30 tons. It died out ten million years ago.

The so-called "true" rhinoceros family (*Rhinocerotidae*) originates from North America. The closest relation to the earliest rhinos is maintained by the Sumatran rhino, a member of the *Dicerorhinus* genus existing since the end of the Tertiary. It is undoubtedly worth mentioning that a Tertiary relative of this rhino inhabited Central Europe. The rhino shared ancestors with a species well adjusted to the life in cold climate, i.e. the woolly rhinoceros (*Coelodonta antiquitatis*) contemporary with primeval man.

Thick hair, found together with the remains of these animals, protected them from inclement weather in the ice age. This contemporary of mammoths inhabiting our region died out ten thousand years ago.

The five living rhino species inhabit warm regions of Africa and southern Asia both on the mainland and the islands of Sumatra, Java, and Borneo.

While millions of rhinos lived still a couple of hundreds of years ago, some forms found themselves on the edge of extinction at the beginning of the 20th century. The devastation of environment, but above all killing for horns has become a curse for the animals. Today a whole group is in critical danger of extinction. At the same time the trade in wild-caught animals and their derivatives (horns, bones etc.) has been illegal for over twenty-five years, according to the Convention on International Trade in Endangered Species (CITES) signed in Washington in 1973 and ratified in 1975.

Together with horses, zebras and tapirs rhinos are odd-toed ungulates (*Perissodactyla*), whose typical sign is the limb's axis going through one (the third) digit. Rhinos have preserved three digits on both hind and forefeet, whereas for instance horses have a single digit. A small hoof protects each digit.

Rhinos have no canines; both the African species lack their incisors. All species are herbivores; some eat grass or browse leaves and twigs. Their thick skin gives rhinos shield from thorns and so they are able to walk through dense thickets. The African species are savanna and open bush animals, whereas Asian rhinos live either in riverine grasslands and adjacent woodlands (the Indian) or in tropical forests (the Sumatran and Javan).

Their prominent size makes rhinos safe against the majority of beasts of prey (lions, hyenas and tigers in Asia) – usually only calves or sick adults can fall their victims. Rhinos' worst enemies are people.



"Primeval Ages by Burian's Eyes" – a gallery of paintings at Dvůr Králové Zoo presents among all the Tertiary *Indricotherium*.

Photo: Dana Holečková

The five living rhino species inhabit warm regions of Africa

The typical sign of rhinos is their horn, used in fights, ritual combats and serving as a protection against enemies. It doesn't grow from the skull but is of dermal origin and its consistence of hair-like fibers reveals that it is indeed a derivative of skin. The self-protective use of the horn is inborn – babies practice attacks on every unknown thing although as newborns they have only a bulge that later becomes a horn. Shall the horn – growing all life – get broken, it is restored after some time.

Even if rhinos appear very cumbersome, they can attain amazing speeds of thirty to forty kilometers per hour for short distances. While rhinos' sight is their weakest sense, they have excellent hearing and smelling abilities.

The gestation is very long and lasts from 400 to 550 days. Mating is long as well – usually it takes at least 20 minutes, often an hour with the male reaching ten to thirty ejaculations. A record 84-minutes long mating was once observed in Indian rhinos. A reason for such a long act of procreation might also be the fact that it is particularly difficult for the male to mount on the female and so it is crucial to avoid unproductive mating attempts. Mating usually ends when the female can no longer endure the male's weight.

Although rhinos perish from our planet, there is relatively little knowledge of their life. The least known are the Asian species, often inhabiting impenetrable areas. Many facts from biology of the species have been learned in captivity – in zoological gardens.



The fiber structure of rhino horns proves they are of dermal origin like hooves, hair or nails.

Photo: Dana Holečková

The curse of rhinos



A war is raging over rhinos. On one side there are conservationists, poachers on the other. As long as rhino horns are worth their weight in gold in China, Taiwan or South Korea, there will be no end to the fight. Rhinos' horns are their curse.

The horn is nothing but transformed skin. However it doesn't prevent 65% of South Korean physicians from considering horns an indispensable component of the treatment of epilepsy, fevers, wounds and AIDS! In China horns and other parts of the body are added to remedies reducing fever, sedating, limiting bleeding, counteracting poisons and building up the organism.

When poachers use helicopters, rhinos are defenseless and so are game wardens. The International Rhino Foundation server published a dramatic notice: "Adopt a Guard/Patrol. With \$25.00 - \$50.00 a month you can provide 2 uniforms and a pair of boots for a guard."

Photo: Daryl Balfour, Gallo Images (www.gallo-images.co.za)

The belief in a healing or magic effect of rhino horn was spread throughout the Old World. Surprisingly, the least interest was shown by the Africans – only certain ethnic communities used (or are using) parts of horns as talismans. But talismans made of other animals – from snake heads to donkey teeth – are also in common use.

The Europeans, like many Asian nations, made cups of rhino horns that served as detection and counteraction against poisons. Poisons were simply believed to lose their power in these cups. Some chemists suspect it might have worked – if certain alkaloids react with the horn keratin.

From the 19th century onwards the role of horns as a material for decorations or utilities, walking sticks for instance, increased. The 1920s found a new use for horn parts: a decoration of the interior of luxurious cars. A positive outcome of the Wall Street collapse in the 1930s was that people soon gave up this trend.

In Arabic societies the horn is a symbol of social rank; in North Yemen and Oman horns are used in production of ceremonial poniards.

Some Hindus (not Chinese as it's sometimes believed) consider the rhino horn an aphrodisiac. But nowadays Hindu pharmacists only sporadically mix rhino horn powder with herbs.

Rhinos are on the brink of extinction. Most of the horns originating from animals killed by poachers are shipped to China, Taiwan and South Korea and sold for up to tens of thousands of U.S. dollars per kilo! (This amount is paid for Asian rhinos' horns – smaller but believed to have more power; horns of African species cost several thousand USD per kilo).

In the mid 1990s, an announcement by the U.S. Fish & Wildlife Service about the keratin structure of rhino horn created hopes that rhino horn could be produced synthetically and hence rhinos could be saved. Unfortunately, the whole result never went beyond this very announcement.

Experts of the Hoffman-La Roche pharmaceutical corporation announced some time ago that no impact of the horn on human organism was noticed. On the other hand, scientists at the Hong-Kong University are said to have proved by experiments on rats that it's not just a superstition. The question whether horns have any effect thus remains open and we can conclude by analogy to the debates on homeopathy that it will be hard to reach an end. The only way is to protect rhinos from poachers.

One solution could be to sedate rhinos and dehorn them. But poachers killed also hornless specimens or rhinos whose horns begin to grow again – to demonstrate the inefficiency of this solution and to sell them for a good price anyway. Scientists discovered that rhinos need



Dehorning was deemed controversial from the very beginning and soon proved to be inefficient.

Photo: Anthony Bannister, Gallo Images (www.gallo-images.co.za)

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In China, Taiwan and South Korea crushed horns are added to remedies against fever or poisons. Rhino skin is used similarly.

Photo: Anthony Bannister, Gallo Images (www.gallo-images.co.za)

their horns to protect themselves and their youngsters and to dig for water and obtain food.

Today microchips are being located in rhinos' horns, allowing the identification of particular horns and thus increasing the hope of tracking down the poachers and traders. In many national parks rhinos are watched telemetrically which keeps them under constant control. This doesn't change the cruel fact that the fight for rhinos between conservationists and poachers will last for some more time.



How many rhinos live in the world?

The peaceful giants face extinction. It is caused by the sale of their horns along with the devastation of environment. Not more than 17,000 rhinos survive all around the planet – it's less than the number of citizens of a provincial town like Dvůr Králové nad Labem.

Species	Wild	Captive	Total population
White rhino (<i>Ceratotherium simum</i>)	~10400	765	~11165
Northern (<i>C. s. cottoni</i>)	28 – 30	10	40
Southern (<i>C. s. simum</i>)	~10400	755	~11155
Black rhino (<i>Diceros bicornis</i>)	~ 2700	-265	~2965
Southwestern (<i>D. b. bicornis</i>)	~750	0	~750
Eastern (<i>D. b. michaeli</i>)	~500	195	~695
Southern (<i>D. b. minor</i>)	~1450	~70	~1520
Northwestern (<i>D. b. longipes</i>)	~ 10	0	~10
Total African species	~13100	~1030	~14130
Indian rhino (<i>Rhinoceros unicornis</i>)	~2400	~140	~2540
Javan rhino (<i>Rhinoceros sondaicus</i>)	~60	0	~60
Indonesian subsp. (<i>R. s. sondaicus</i>)	50 – 60	0	50 – 60
Vietnamese subsp. (<i>R. s. annamiticus</i>)	5 – 8	0	5 – 8
Sumatran rhino (<i>Dicerorhinus sumatrensis</i>)	~300	15	~315
Malaysian subsp. (<i>D. s. sumatrensis</i>)	~250	13	~260
Borneo subsp. (<i>D. s. harrissoni</i>)	~50	2	~50
Total Asian species	~2760	~155	~2915
Total rhinos	~16000	~1200	~17000

The source of these data are the IUCN/SSC African and Asian Rhino Specialist Groups (AfRSG & AsRSG) and the International Rhino Foundation (IRF), 2001

White (Square-lipped) Rhino



Northern White Rhino

- Earlier habitat
- Present habitat

Southern White Rhino

- Earlier habitat
- Present habitat

The White Rhino is the larger of the two African species, rivaled in size among the rhinos only by the Indian.

As white rhinos feed on grasses, their broad upper lip is adjusted to grazing (hence the name square-lipped). The "white" component is a mistranslation of Boer "wite" meaning wide. There is no color difference between African rhinos.

White rhinos are more territorial than the black rhino. Units consist of a territorial male and subordinated males and females with calves. Their relatively small territories span to 3 sq. km, but their size depends on the quality and availability of food. Females' home ranges of 6 to 20 sq. km sometimes overlap several males' territories. Pregnant females leave their groups shortly before the birth and stay aside for several days afterwards. The calf usually walks in front of its mother and is driven away at the age of 2 to 3.



Illustration: J. and L. Knotek

Weight: males 1800 to 2400 kg, females 1800 to 2000 kg

Height in shoulder: 1,5 to 1,8m

Number of horns: two, record length of first horn 158 cm, average 65 cm

Gestation: 480 to 514 (548) days with average 490 days

Weight at birth: 40 to 80 kg

Sexual maturity: 6 years (females) to 10 years (males)

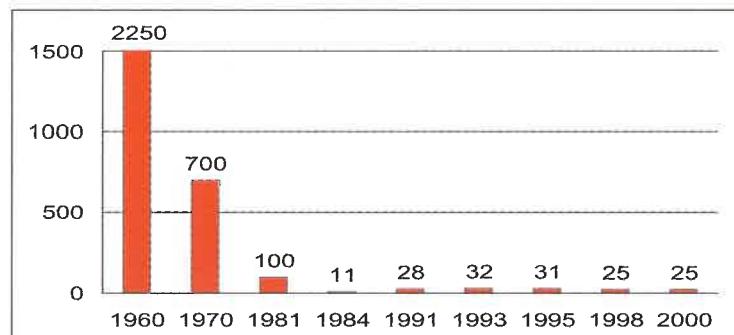
Habitat: savanna

Food: grasses

Life span: up to 45 years in captivity

Northern white rhino (*C.s. cottoni*) used to be widely spread on open grasslands of central and east Africa. Today it is on the brink of extinction with last 30 wild animals surviving in Garamba NP in the Democratic Republic of Congo.

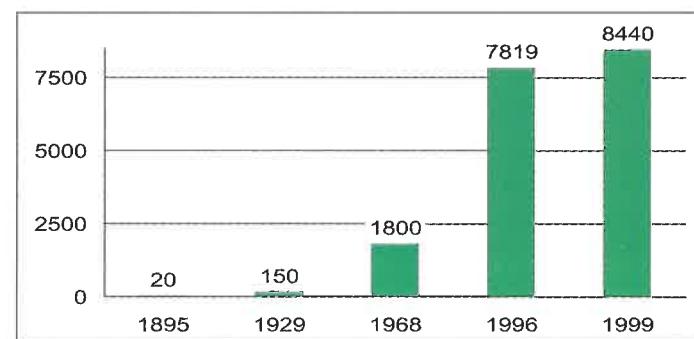
Ten specimens are kept captive, of which 9 are owned by and 7 are kept at the Dvůr Králové Zoo, the only institution to have bred this rhino (4 surviving calves and 1 abortion). The International Studbook is kept by Berlin Zoo.



Decline of the northern white rhino population. In the first years of the XX century thousands of these rhinos lived in Africa.

Southern white rhino (*C.s. simum*) lives in southern Africa. On the turn of the XIX century it was critically endangered by extinction. The population was even smaller than the present number of northern white rhinos. Not more than 20 specimens stayed alive. A consequent protection, done above all by white farmers, helped save the subspecies. Today it's the most numerous of all the rhino forms – the population has increased to over 8 thousand animals. Apart from South Africa (7500 white rhinos) they can be found in Namibia, Botswana, Zimbabwe, Zambia and Swaziland and some were relocated to Kenya.

There are 765 specimens in captivity. In the Czech Republic the subspecies reproduced only at Dvůr Králové Zoo (3 youngsters) and Ústí nad Labem Zoo (also 3 births). The International Studbook is held by Berlin Zoo.



Southern white rhino: Evolution of the wild population.

Sadness with a little beacon of hope

Visiting the Dvůr Králové Zoo you can see seven northern white rhinos altogether, that is *one fifth* of their total population. Other three (of which two are also owned by Dvůr Králové Zoo) live in San Diego. According to the census of August 2000, 28 - 30 wild northern white rhinos survive in the Democratic Republic of Congo's Garamba National Park.

Passionate hunters decimated the large population of northern white rhinos in late 19th and early 20th century. An example: count Teleki, on his expedition to discover lakes Rudolph and Stephanie (now lakes Turkana and Chamo), shot more than 79 rhinos.

Next chapters in the gloomy history of these animals were written by wars in the last few areas of their presence. In early 60-ties soldiers shot hundreds of rhinos with machine guns...

In spite of all this, the population of the northern white rhino exceeded 100 specimens yet in 1981. Three years later eleven animals survived!

The overwhelming cause of the decline has been poaching. In early 80s 1,75 tons of rhino horns per year were shipped to Northern Yemen. They were used for handles of ritual curved daggers for which the manufacturers believed white rhinos' horns were most suitable. The situation improved only in mid 1980s, when oil prices fell and the society of Yemen was hit by poverty. In the meantime, when the government of Northern Yemen took measures to stop the trade in rhino horns, the market's attention was at least in a part shifted to buffalo horns.

Strict protection of the rhinos surviving in Garamba NP soon resulted in a slow increase in their number, from 28 rhinos in 1991 to 32 in 1993 and 31 in 1995.

But history likes to recur. Civil war broke out. In 1996 media reported that two rhinos were slaughtered in Garamba. So were three game wardens. Armed rebels killed a pregnant female the same year, then a male was shot in 1997. After the first civil war ended, WWF experts found 25 rhinos in Garamba in the spring of 1998. After the conflicts broke out again, it was no longer possible to control rhinos in Garamba.

Only in the spring of 2000 experts returned to Garamba. Unable to find some of their "old friends", they met three youngsters on the other hand. In a report from August it is confirmed that at least 28 rhinos live in Garamba, of which one was expected to give birth soon.

Is there a hope for the northern white rhinos to survive? Dvůr Králové Zoo director Dana Holečková thinks there is: "Nevertheless, if the situation in Garamba remains unstable, it would be optimal to transfer the wild and captive populations to a destination with good conditions for reproduction,



Female southern white rhino with her calf. White rhino subspecies don't differ in look (although in the northern form ear rims and tail tips are more hairy) but a genetic divergence was discovered. For tens of thousands of years they have inhabited outlying areas.

Photo: Dana Holečková

like South Africa or Australia... Unfortunately, no power is apparently strong enough to persuade the authorities of Congo to allow the transfer". She adds that the southern white rhino was on the brink of extinction as well and that it was saved into the most numerous rhino form.



A unique picture of northern white rhinos in Garamba. Game wardens weren't armed during the 2nd civil war but struggled to continue despite the absence of conservationists and technical advisors. This obviously contributed to Garamba's relatively good survival.

Photo: Kes & Fraser Smith, International Rhino Foundation

A hope for the northern white rhinos can be found in the only two localities where they reproduce – Garamba and Dvůr Králové nad Labem.

Wild northern white rhinos in Garamba by sex and age (August 2000, according to IRF)

Number	Males	Females	Unknown sex	Total
Adult animals	6	7	-	13
Sub-adult animals	2	3	-	5
Calves	7	1	2	10
Total	15	11	2	28

For a detailed description of the captive breeding of northern white rhinos and the birth of the "Baby of Millennium" see pages 18 – 29.

Black rhino (*Diceros bicornis*)



Earlier habitat
Present habitat



Illustration: J. and L. Knotek

White rhinos are not white and black rhinos are not black, both are grey. The name "black rhino" originated as a logical distinction from "white rhino".

The black rhino is significantly smaller than the white one. Unlike in the latter, black rhinos' upper lip is prehensile and adapted to gathering leaves. As the food habits of the two species are different, they can occupy the same area without rivaling.

Black rhinos are solitary except estrous and mating periods and mothers with calves. Calves follow their mothers or walk by their side and stay with them for 2 to 3 years.

Up to now black rhinos disappeared from most of their original habitat and today can be found only on protected areas in Kenya, Namibia, South Africa, Swaziland, Zimbabwe, Mozambique, Tanzania, Malawi, Rwanda and Cameroun.

There are 4 subspecies of black rhinos, of which the southern form (*D. b. minor*) is the most numerous with almost 1400 specimens, whereas the western subspecies (*D. b. longipes*) is the most endangered with more or less ten specimens in Cameroun.

There are 230 specimens (of the eastern and southern subspecies) in captivity, out of which 13 can be found at Dvůr Králové Zoo – the only Czech Zoo to keep and reproduce them. Altogether 24 youngsters have been born here, including the first calf in the world to be born in 5th captive generation. The International studbook is kept by Berlin Zoo.

A demonstrative example

Black rhinos have encountered circumstances that could hardly be expected on the turn of the XX. century. Since the 1960s its population has declined from 70 000 – 100 000 to the present 2 600 specimens. Poaching and trade in horns have been the major cause of the decrease. The efforts of the involved countries, with a strong support from the West,

haven't brought any effect. For instance in Zimbabwe the population fell from 1400 in early 80s to 339 in late nineties. Four factors have had the most significant impact on the fortune of rhinos, of which particularly the first one ranges beyond Zimbabwe borders:

Demand for rhino horns: Trade in horns is in theory prohibited by the CITES convention; nevertheless even the partners to the convention still do trade in horns or derived remedies. In a repeated trick the horns stored before a country signed the CITES are overvalued – so that the horns of animals slaughtered much later by poachers are legalized. The formerly transparent trade in rhino horns has been shifted to the gray sphere, where documents are "only" forged, or onto the black market. The CITES has undoubtedly contributed to rhino protection, but the contribution is insufficient. One can hardly hope for a better situation if the high demand for African rhino horns keeps the price as high as several thousands of US dollars per kilo.

Poverty: In 1990, while Thai traders paid 10 000 USD per kilo of rhino horn and in Taiwan horns were sold for more than 4 000 dollars, poachers in Africa were actually paid less than 30 – 100 dollars for both horns. For younger and older men, without employment or prospective future but with large families, this was a fabulous sum. It attracted poachers from bordering Zambia to cross the Zimbabwean border. Anti-poaching operations, held under the umbrella of the "Shoot to kill" action, haven't stopped the decline of the black rhino population...

Access to weapons: Practically everywhere in Africa, even where natives live almost in stone age conditions, two elements of the western civilization appear. One is Coca-Cola and the other the AK-47 - an automatic gun developed in the Soviet Union (also fabricated in former Czechoslovakia for some time) that was sold almost always and almost everywhere at very low prices. Zimbabwe was hurt by civil war for many years and only in 1990 the state of emergency from 1965 was ceased. People have kept their weapons ever since.

Corruption: Several Internet and press sources prove that the illegal rhino hunt in Zimbabwe involved even the highest military authorities of the country. Particular interest was awoken by the case of captain Edwin Nleyi who died in 1989 after he had begun collecting evidence material against army leaders. Although the authorities examining the case declared that Nleyi committed a suicide, in a later court investigation it was concluded he was murdered. Coincidence? Two years later lieutenant Shephard Chisango died in a police ward. He had found evidence on poaching and smuggling of horns to Mozambique, in which the army would take part. Several other Zimbabweans died later in similar circumstances. None of the cases, the headline-making Nleyi's murder including, has been explained.

Since 1996 race-oriented tensions have grown in Zimbabwe. Today the state runs a silent war against the white minority. In such conditions the fight against poachers cannot be expected to bear more fruit than in last two decades.



The fact that 95% of the wild black rhinos were exterminated in the past eighteen years is frightening.

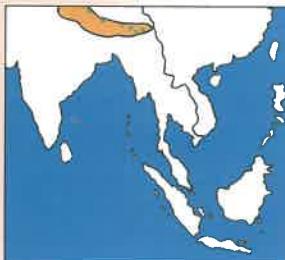
Photo: Anthony Bannister, Gallo Images (www.gallo-images.co.za)



Young black rhino killed by poachers. Not only poverty or care of their families drives them to the slaughter. Sometimes it's just a prosaic reason like a new car...

Photo: Beverly Joubert, Gallo Images (www.gallo-images.co.za)

Greater Indian rhino (*Rhinoceros unicornis*)



Earlier habitat
Present habitat

Unlike in African rhinos, Indian rhinos' incisors are well developed (bottom cutters are turned upwards). Their upper lip is of a fingerlike shape. Indian rhinos are solitary by nature and occupy territorial ranges of approximately 6 sq. km. Females meet males only in estrous and mating periods. A female in heat first provokes males by very intensive whistling; then males chase females. Indian rhinos use their incisors in fights with each other.

This species was the first victim of the Asian rhino horn trade and is extinct on most of the original habitat. Today it survives in several reserves in India and Nepal, of which the Indian Kaziranga is the most important. Floods caused by deforestation of Himalayas now present a danger for rhinos that actually seems to exceed the impact of poaching.

140 specimens are kept in captivity. Three of them can be found at Dvůr Králové Zoo, which is the only Zoo countrywide to reproduce this species (3 calves have been born here so far). The International studbook is kept by Basle Zoo.

Translocation of rhinos

On the turn of February/March 2000 a huge maneuver took place in Nepal, the aim of which was to relocate several Indian rhinos. Three males and seven females, captured in Chitwan National Park with the help of trained elephants, were loaded on truck and carried to Bardia NP.

Twenty-five years ago only six to seven hundred Indian rhinos inhabited the Indian subcontinent. Thank to rigorous protection, the population has increased to the present 2 500 specimens. The main problem persists: the original habitat of rhinos, formed by grassy lowlands, forests and swamps, was peopled and adapted to human needs. Rhinos' area



Illustration: J. and L. Knotek

Weight: males 2000 to 2500 kg, females 1700 to 2000 kg
Height in shoulder: 1,7 to 1,9m (the tallest of all rhinos)
Number of horns: one, record length 61 cm
Pregnancy: 480 to 516 days
Weight at birth: 55 to 81 kg
Sexual maturity: 4 years (females) to 9 years (males)
Habitat: tropical rainforest with adjacent water, marshlands, and irrigated valleys
Food: grass, aquatic plants and cultivated rice crop
Life span: 40 to 45 years
Wild population: XV century – around 500 000 specimens, 1960 – 750, 1970 – less than 1200, 1993 – 2000, 1996 – 2200, 2000 – 2482

was thus reduced to a small number of national parks with insufficient capacity.

The royal national park of Chitwan in Nepal is inhabited by more than 500 rhinos, a considerable population for such a park. Changes in vegetation make grassy plains shrink thus forcing rhinos to migrate towards the park boundaries and sometimes to march onto neighboring plantations. Then they chance on the risk of being poisoned or killed by electric stream. Therefore, as well as in order to create another separate Nepal population of rhinos, conservationists have initiated the translocation. The first thirteen animals were transferred from Chitwan to Bardia NP in 1986, another group of 25 specimens in 1991, 5 in 1999 and 10 in early 2000.

The operation began at 6 a.m. on the 27th of February. The technical team, carried on six elephants, set off to search for rhinos and soon found an adult male. It matched the criteria – the team had decided to transport healthy young or adult animals of both sexes, whereas sexually mature young males were the optimal candidates. The male was sedated by an Immobilon projectile, examined and loaded on a truck. The very afternoon another male, younger than the previous one, was caught. The trucks carrying both the animals left for the Bardia National Park and arrived at the destination after twelve hours on the road. On the following day both males were released to the wild.

In the next two days the team, equipped with fifteen domesticated elephants, managed to catch four rhinos, three of which were females. Although the team then moved to a dense forest and the capture became more difficult, two females were caught.

Local villagers complicated the fifth day of the operation. Although they perceive rhinos as a threat to their crops, they realize that the animals make the region attractive for tourists, which further means a considerable income. Hundreds of locals who had gathered round before the catching started frightened a young female and so she escaped into the forest. Only a young male was captured.

The sixth day was rich in obstacles again. An adult female, whom the game wardens called Lakshmi after the goddess of fortune and richness, had to get a double portion of sedatives – it was one of the heaviest animals caught, weighing around two tons. Given an antidote, Lakshmi recovered aboard the truck and broke her horn. The attending veterinary doctor didn't find the injury heavy and it proved to be so indeed – on the next day, April 4th, Lakshmi ran

off towards a river, forded it and disappeared in the grass.

Bardia Royal National Park is now inhabited by 52 Indian rhinos transferred from Chitwan. It is enough for the population to reproduce and survive. By coincidence, Lakshmi's daughter stays in Bardia as well – she too was caught in the last year's operation.



Elephants ready to set off for the capture of rhinos in Chitwan NP. In India and Nepal also tourists can travel on elephants to watch rhinos.

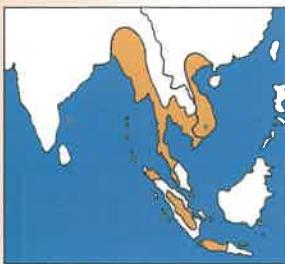
Photo: Basant Subba and Tenzing Sherpa, WWF



A small dosage of Immobilon, usually one or two shots, suffices for the immobilization of rhinos and other ungulates. The animal in the picture is Lakshmi.

Photo: Basant Subba and Tenzing Sherpa, WWF

Javan rhino (*Rhinoceros sondaicus*)



Earlier habitat
Present habitat



Illustration: J. and L. Knotek

Although in its appearance it's almost a smaller copy of Indian rhinos, its skin folds are less developed and its head and horn are relatively smaller. Habits of this rhino remain almost completely unknown – inhabiting impenetrable forests, the rhino is extremely difficult to watch. It is assumed to be a solitary animal.

Out of the three known subspecies one (*R. s. inermis*) died out.

In the Javan Ujung Kulon reserve there live 43 to 57 specimens of the Indonesian subspecies (*R. s. sondaicus*). The Javan rhino was recently rediscovered in Vietnam where less than 10 specimens of the Vietnamese form survive (*R. s. annamiticus*). Most probably the population consists of 6 to 8 surviving animals.

Twenty-two Javan rhinos have been kept captive with the last dying in 1907. They never reproduced in captivity.

Vietnamese rhinos

After fire was ceased in the Vietnamese war, the majority of zoologists had no doubt that the local rhino subspecies died out. In 1989, however, a horn and skin of a rhino killed by a poacher in Cat Lac region were offered for sale. Ecological organizations along with many authorities revived their struggle to save the Vietnamese rhinos.

Rangers in the Cat Tien National Park, of which the "rhino area" Cat Lac is a part, manage a folded area covered by thick jungle with bamboo and short trees, without road access. It rains nonstop for nine months a year, which turns lowlands into swamps. Mosquitoes spread malaria, dengue fever and Japanese encephalitis. Despite the horrible conditions, game wardens put all their energy to protect the last rhinos, even if neither they nor the zoologists who come to Cat Lac mostly from the U.S. have ever seen a rhino there. Only from the marks

left by rhinos they can reckon there are between six and eight of them.

In May 1999 a team led by Gert Polet from the WWF selected ten places where the emergence of rhinos was most likely. The zoologists mounted cameras with infrared sensors on trees. Every two weeks game wardens absolved long marches to change films in each of the cameras. After the first four rolls were developed, seven long-awaited photos came out – first seven pictures of live Vietnamese rhinos were taken!

Polet hoped that the data from various cameras would help him collect details relating not only to the number of Cat Tien rhinos, but also to their size, sex and reproduction. All following efforts turned out to be vain. "It almost appears," Polet says for Science News, "as if the cagey critters are out to sabotage the systems. Where hoofprints appear, they are now behind the trees bearing cameras. Several infrared sensors have also been roughed up and shoved out of alignment, presumably by the rhinos."

Although the pictures themselves didn't include too many details, the attention of media helped zoologists and conservationists to stress once again how critical the situation of the last Vietnamese rhinos is. After a new economic zone was created in the region in 1992, also covering Cat Tien, farmers from the overcrowded north of the country settled down there. They started planting rice, cutting forests and obtaining rattan directly from the national park. The area where rhinos could live has been diminished to as little as 15% of the original range. That's too small for them.

Discussions on finding the optimal solution started again. According to one of the options, people should be relocated so that rhinos are given more living space. The villagers will presumably agree on leaving provided that they are sufficiently paid to do so.

Another option postulates that the Vietnamese rhinos be transported to Javan Ujung Kulon reserve where the Indonesian subspecies is surviving. It would mean having "all eggs in one basket". Questionable is also whether a larger population would find enough food in Ujung Kulon. Finally the question emerges whether a possible genetic difference between the two subspecies might turn their interbreeding into a decrease in the ability to survive.

According to the third variant, supported by Polet, Vietnamese rhinos should reproduce in captivity and be released in a safe destination, for instance Sumatra. Nobody can assure the success of captive breeding, though.

To take a decision too quickly wouldn't be appropriate here. At the same time, unless a decision is taken soon, the seven pictures might be all that remains after Vietnamese rhinos.

Only seven pictures of Vietnamese rhinos have been taken so far. Self-shooting cameras are nowadays used in the research of other endangered mammals in Asian jungles, for instance tigers.

Photo: Mike Baltzer, World Wildlife Fund – Cat Tien Conservation Project



Sumatran rhino (*Dicerorhinus sumatrensis*)



Earlier habitat
Present habitat

It is considerably smaller than other rhinos, has two horns and a body covered with stiff skin. Biology of this solitary resident of impenetrable forests remains unknown.

Its present habitat consists of several isolated areas. In Sumatra and on the Malaysian peninsula the Malaysian subspecies (*D. s. sumatrensis*) can be found with around 150 specimens in Sumatra and the continental population not exceeding a hundred.

The number of individuals of the Borneo subspecies (*D. s. harrissoni*) in the Indonesian part of Borneo is unknown. In the Malaysian part of the island last 50 animals survive in Sabah province.

As few as 17 specimens are kept captive, of which three ex situ and 14 in the original habitat. Only one calf has been born in captivity so far to a female who arrived pregnant from the wild.



Illustration: J. and L. Knotek

Weight: 500 to 820 kg

Height in shoulder: 1,25 to 1,4m

Number of horns: two, record length of first horn 82 cm

Pregnancy: approximately 400 days

Weight at birth: 35 kg

Habitat: tropical rainforest, especially mountain areas

Food: twigs, lianas, bushes, other plants

Life span: 35 years

Wild population: 1995 – 390 to 540, 2000 – around 300

reproduction was hoped to form a captive population to be possibly reintroduced to the natural Asian habitats.

A year later the capture started in deforested district or on areas with few rhinos. After a rhino fell into one of the hollows dug out on forest paths and covered with leaves, it was put into a crate and loaded on a truck. Out of the forty rhinos caught 19 (almost 50%) died. Two rhinos were shipped by air to England (Port Lympne Zoo) and USA (for instance to San Diego Zoo or Cincinnati Zoo). The Indonesian government received 60 to 80 thousand US dollars to be spent on the protection of natural habitats.

Not only didn't the relocated rhinos reproduce in captivity - except Cincinnati they didn't show any sexual behavior. Although little is known about the habits of this rhino, it is certain that after a female stays nonstop with a male, the latter loses his sexual interest in the dam. In many destinations one animal of the couple would soon die leaving the remaining specimen deserted. Therefore most of the remaining animals were sent back to Asia in late nineties and were located in newly established breeding facilities.

Only in Cincinnati a male and two females survived. One of the females is now (June 2001) in her 12th month of pregnancy. Her previous pregnancies were unsuccessful and none of them lasted for more than three months. This pregnancy is hormonally supported to avoid miscarriage. It is certainly questionable whether the rectal ultrasonograph tests carried out every five days have no negative impact on the pregnancy and whether they are really necessary when non-invasive methods could be used instead.

Along with the American effort, three breeding centers were established in Malaysia and Indonesia where rhinos are kept on a relatively large area of enclosed tropical forest. Repeated cases of mating were reported in the past years but none of the ten living females proved to be pregnant.

One of the centers, situated in Sumatra's Way Kambas NP, is home to three specimens of the Malaysian subspecies. A male relocated from Port Lympne Zoo in England and two females from Indonesia each occupy 20 hectares of forest.

Another center is sited in Sungei Dusun on the Malaysian peninsula. Eight rhinos (two males and six females) inhabit five hectares of land. Among them there is Minah, a female born in 1987 in Malaka Zoo that was the first and so far the only Sumatran rhino born in captivity. Her mother Rima, now in Sungei Dusun as well, was already pregnant when obtained from the wild.

The third breeding facility holding two females and a male of Borneo subspecies was established in the Sepilok reserve in the Malaysian territory of Borneo.

Last three hundred Sumatran rhinos live in the wild. The first video footage was taken only in June 1992. A short infrared nocturnal recording pictures a rhino with very sharp and relatively long horns as it apparently reacts on human scent and disappears in the jungle after several side-to-side swings.



The Sumatran rhinoceros is at present the most primitive rhino species. The *Dicerorhinus* genus existed already in Tertiary.

Photo: Brent Huffman, The Ultimate Ungulate Page
(www.ultimateungulate.com)

The Baby of Millennium

Since the seventies, the speciality of the Zoological Garden of Dvůr Králové nad Labem has been the breeding of African fauna. The animals to create the initial populations were obtained from the wild during eight expeditions organized in the 60s and 70s by the then-director Ing. Josef Vágner, CSc. The Zoo thus became a non-African reservoir of these animals' genes. It is not a result of coincidence that altogether 63 cape buffaloes, 14 roan antelopes and 2 scimitar-horned oryxes originating from this Zoo have been already reintroduced to their natural African habitat.

Breeding rhinoceroses is far the most significant activity of the Zoo. A group consisting usually of 23 to 26 specimens in three species is the largest collection in Europe and the second largest in the world.

In Dvůr Králové Zoo's new logo of 1996 the symbol of the Zoo is pictured – a female northern white rhino with a calf standing in the shadow of her. Along with this species, black and Indian rhinos are bred here. The number of thirty-five youngsters born situates the Zoo right after the institution with the most births in the world – the Wild Animal Park, a part of The Zoological Society of San Diego (see chart below).

Species (Status 31. 12. 2000)	San Diego Wild Animal Park	Dvůr Králové Zoo
Northern white rhino	3 (1.2) of which 0.2 on loan from Dvůr Králové	7 (3.4)
Southern white rhino	13 (4.9)	1 (0.1) hybrid
Black rhino	5 (4.1)	14 (4.10)
Indian rhino	12 (3.9)	3 (1.2)
Total rhinos	33 (12.21)	25 (8.17)

Explanation: 3 (1.2) stands for 3 animals, 1 male and 2 females

In the night of June 29, 2000 a northern white rhino was born at Dvůr Králové Zoo after long eleven years. To stress the importance of this achievement it is called the "Baby of Millennium".

A description of events preceding and accompanying the birth follows.

The northern white rhino at Dvůr Králové Zoo

According to the International Studbook, as few as 24 specimens of this subspecies were ever kept in captivity, of which twenty were captured in the wild between 1950 and 1975 and the other four were born in captivity (the fifth pregnancy ended with an abort). At present, nine out of the ten captive specimens are held by Dvůr Králové Zoo where a group of seven animals can be found (males Saút, Súdán and Suni and females Nesáří, Nabiré, Nájin and Fatu, the Baby of Millennium). In 1989 two females Nádí and Nola were sent on loan to the San Diego Wild Animal Park in USA where they live together with Angalifu, a male transferred from Khartoum Zoo.

The first group of the Northern White Rhinos to arrive in Dvůr Králové was caught in Sudan in 1975 and consisted of two males (Súdán and Saút) and four females (Nola, Núří, Nádí and Nesáří). Two years later Nasima, a female born in Uganda, was imported from



Prescot Zoo in England. Nasima arrived pregnant and soon delivered a female (Nasi) – a hybrid with the southern white rhino, the subspecies the dam was kept with at Prescot Zoo.

After Nasi had grown up, Nasima was introduced to both the males. And in 1980 she gave birth to Suni, the first youngster of the subspecies to be born in captivity. His father was the eight-year old Saút. Except for sporadic mating attempts the other adult females in the group were never bred. In the meantime, in 1982, Núří died at the age of nine. Nasima was also mated by Súdán and gave birth to a female (Nabiré) in 1983.

In mid-1980s the northern white rhino was extinct in Uganda and Sudan. Last fifteen animals survived in Garamba NP in former Zaire. The only breeding group in the world,



Group of northern white rhinos at Dvůr Králové Zoo, with Nájin in the middle.
Photo: Khalil Baalbaki

Northern white rhinos imported from the wild (according to the Studbook)

No.	Sex	Studbook no., house name	Year and place of birth	Transfer	Death	Remark
1	M	0015 Paul	1948 Sudan	1950 Antwerp	1968	
2	F	0016 Cloé	1948 Sudan	1950 Antwerp	1985	
3	M	0019 Ben	1950 Sudan	1955 London 1986 Dvůr Králové	1990	Euthanasia due to age
4	M	0027 Bill	1952 Sudan	1956 Washington, DC 1972 San Diego	1975	
5	M	0028 Lucy	1952 Sudan	1956 Washington, DC 1972 San Diego	1979	
6	M	0054	1963 Sudan	1965 Ryiad	1990s	ZOO doesn't respond
7	F	0055	1963 Sudan	1965 Ryiad	1990s	ZOO doesn't respond
8	F	0075 Joyce	1952 Sudan	1957 St. Louis 1972 San Diego	1996	died at 39 years of old age
9	M	0074 Dinka	1952 Sudan	1957 St. Louis 1972 San Diego	1974	
10	F	1123	1963 Sudan	1964 Khartoum	1967	
11	M	0347	1968 Sudan	1970 Khartoum	1978	
12	F	0345 Tofacha	1970 Sudan	1972 Khartoum 1973 Al Ain	1978	
13	M	0348 Angalifu	1972 Sudan	1973 Khartoum 1990 San Diego WAP		Today with two females (Nádí, Nola)
14	F	0351 Nasima	1965 Uganda	1971 Prescot 1977 Dvůr Králové	1992	The 1 st breeding female, died on collapse
15	M	0373 Saút	1972 Sudan	1975 Dvůr Králové 1989 San Diego WAP 1988 Dvůr Králové		2 nd breeding male, 1989-1998 on loan at San Diego WAP
16	M	0372 Súdán	1973 Sudan	1975 Dvůr Králové		The 1 st breeding male
17	F	0375 Núří	1973 Sudan	1975 Dvůr Králové	1982	Died on collapse, trauma
18	F	0377 Nesáří	1972 Sudan	1975 Dvůr Králové		No gestation despite mating (by Suni)
19	F	0374 Nola	1974 Sudan	1975 Dvůr Králové 1989 San Diego WAP		On loan at WAP since 1989, mated by Saút
20	F	0376 Nádí	1972 Sudan	1975 Dvůr Králové 1989 WAP San Diego		On loan at WAP since 1989

Bold font indicates living specimens.

Studbook numbers are given together to both the white rhino subspecies, hence the gaps.

living at Dvůr Králové Zoo, began to attract the interest of international organizations. A meeting of the IUCN Captive Breeding Specialist Group (CBSG) took place in Dvůr Králové in February 1986. It resulted in a number of recommendations aimed at getting the other males involved in reproduction. The first problem to be solved by a newly created Dvůr Králové workgroup was the necessity to establish a new rhino house – the capacity of the existing two houses was insufficient. After the necessary design preparations for the construction started and it was completed in 1989. Its effect is a breeding facility that probably is the biggest rhino house in the world with 130 meters of length and enough space for 20 animals.

Another problem was that because of the animals' safety a male was never kept non-stop with the group but was introduced to the females in heat. Since all the outdoor enclosures were surrounded by a U-shape moat, there was a danger of a female falling down in a fight. After one enclosure had been reshaped to eliminate the risk of the animals falling into the ditch, a male was regularly socialized with the females.

One of the other crucial tasks was to get information about the females' hormonal activity. Urine, blood, mother milk and saliva samples were collected from the females and sent to the Research Institute of the Zoological Society of London where professor Keith Hodges monitored rhino females' cycles using the level of hormonal metabolites in urine. Although that research was only fresh in lasting, it already brought a lot of useful data: above all it was found out that all females except Nasima practically didn't have a cycle. With the increasing number of samples taken, their transportation to London became more and more problematic. In late 1980s troubles with the examination itself appeared and many of the samples were never scanned. Fortunately, after Prof. Hodges left London, the department of biochemistry of Vienna Veterinary University took over the research. The Zoo started co-operating with Prof. Franz Schwarzenberger, who created a brand new method of monitoring the cycles in rhino females by analyzing the level of sexual hormone metabolites in faeces, which is an easier solution in terms of collecting the samples. After the state borders were opened and the Austrian visa duty for Czechs was annulled in 1990, the transportation of samples to Vienna became a regular and easy issue. Results were produced without unnecessary delays. Prof. Schwarzenberger published his method in 1993 and today it's used for all rhino species in European Zoos.



The first mating of Saút and Nájin on September 14, 1998. After long years the hope in reproduction of the northern white rhinos grew again.

Photo: Antoni Gucwiński

first mating attempts occurred.

It was apparent that acquiring a new male would be extremely useful. At that time, though, the capture of wild specimens was absolutely impossible. Only a 36-year old male Ben was available in London, where he never bred and lived alone for years. Ben was transferred to Dvůr Králové in 1986 and joined the group of females. They awoke his interest and he responded to Nasima's estrous, but was no longer able to mate.

Between 1987 and 1990 hormonal stimulation of females took place. However a regular estrous never followed it. At the same time the feeding was changed as well as the intensity of light inside the house and vitamins were added to food.

Nasima gave birth to a third baby – the female Nájin - in 1989 and miscarried a female six months prior to the delivery. She died in 1992.

A reason for the absence of hormonal cycles in females can be a social barrier (known in the cases of gorillas and cheetahs) resulting from the social behavior of this rhino species. Specimens who grew up together or live together all the time do not breed (the barrier mechanism is unknown and does not exist in black or Indian rhinos who are solitary and where even close relatives breed in captivity). To provide a social change in the group, a non-breeding pair of animals of the southern subspecies was imported from Cologne Zoo in Germany in 1990. Inasmuch as the expected effect unfortunately didn't occur, the pair returned in 1996.

As the northern subspecies was critically endangered, the Zoological Society of San Diego together with the CBSG invited Dvůr Králové Zoo to co-operate in the breeding of these unique animals. The aim was to find out whether a change of location and conditions, particularly the climate, could contribute to the breeding of the wild-born females. According to the decision taken after complicated talks, three animals (male Saút and females Nola and Nádi) were to be sent on loan to the United States. On October 13th, 1989 the trio left Europe for the Wild Animal Park in Escondido, situated in the desert some forty kilometers northeast of San Diego. In the following year another male, Angalifu, was transferred to the W.A.P. from Khartoum Zoo and was also regularly connected with the females. No sexual activity was observed, though.

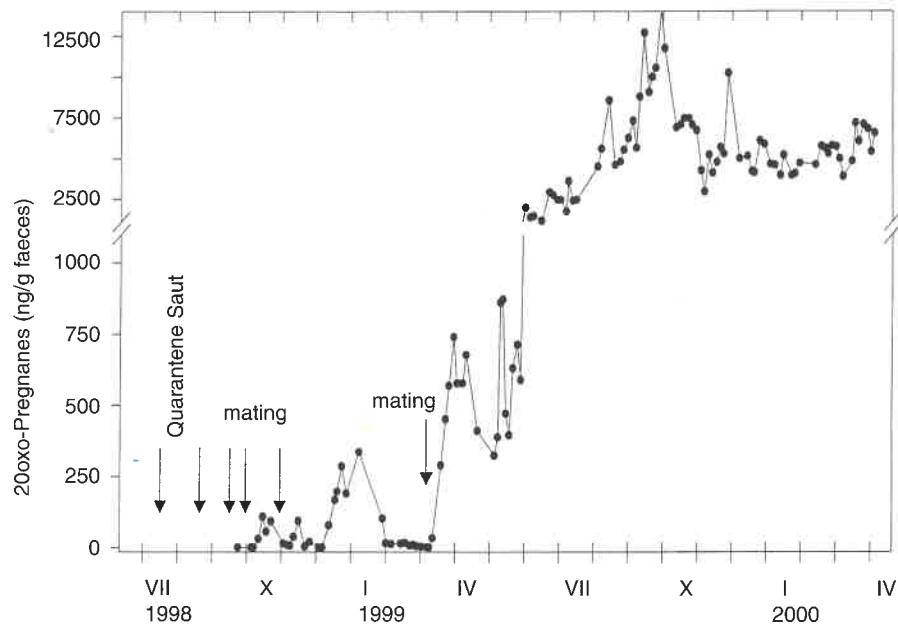
In October 1995 an international conference on the Northern White Rhino took place in the USA and was attended by representatives of the San Diego Zoo & Wild Animal Park, Dvůr Králové Zoo, Garamba National Park, governmental authorities of Zaire and other specialists. The American side promised to start hormonal monitoring of the females (like it was carried out in Dvůr Králové) and to intensify reproduction attempts. In case no change occurred within six months, the females were to return to Dvůr Králové Zoo. At the same time Zaire authorities admitted the possibility of finding a young non-territorial male in Garamba for the Czech Republic. Dvůr Králové specialists were therefore supposed to visit



"Mud baths" help wild rhinos get rid of parasites but also in captivity rhinos are fond of them.

Photo: Dana Holečková

Laboratory verification of Nájin's pregnancy



The contents of hormonal metabolites in Nájin's faeces (original graph by Prof. Schwarzenberger)

Garamba in the spring of 1996. After the civil war broke out in Zaire, these plans never became reality.

Meanwhile, when both the females in San Diego were hormonally stimulated, Saút repeatedly mated Nola. Therefore the idea to transfer the females back to Dvůr Králové was abandoned. Unfortunately, despite these small steps towards success, the animals didn't breed at the Wild Animal Park.

Discussions among specialists showed that U.S. institutions successfully breeding the Southern White Rhinoceros recommended that a male be kept with females for at least five months in a year, staying all day long with the group. Furthermore food should contain enough sprouts, an important source of vitamin E. At Dvůr Králové Zoo rhinos were kept together in the summer since the outdoor enclosure was reshaped and the moat flattened to avoid females being pushed into the moat during a fight. At the same time communication of females with the males Súdán and Suni was enabled while they were kept indoors.

The everyday menu of white rhinos consists basically of grass or hay. Fruit, vegetables and bread are only a supplement.

Photo: Zoo archives



Hormonal activity was still monitored and it was found out that sexual hormone levels increased in late summer and in the fall, which was an effect of the continuous presence of a male. No female was hormonally stimulated since 1993; in 1994 only vitamin E addition was fed to them.

Repeatedly but irregularly the females were mated: Nesáří by Suni (June 9, 1993 & Jan. 24, 1994), Nabiré (Sept. 5, 1994) and Nájin (Sept. 10, 1997) by Súdán. None of them got pregnant. The young and perspective females Nabiré and Nájin were alternately socialized with their brother Suni and father Súdán and it was obvious that a non-related male

was needed. As imports from Garamba were impossible, the W.A.P. was asked to send Saút back to Europe. The years of Saút's absence could cause a change in Dvůr Králové females' behavior and increase their sexual activity.

Two difficult years of talks and administrative procedures ended with Saút's transfer on July 15, 1998. On leaving the quarantine, Saút joined all the four females (Nasi, Nesáří, Nabiré and Nájin). As expected, first sexual contacts occurred already in September.

On September 14, Saút mated Nájin for twenty minutes and five days later he attempted to mate Nesáří. He bred Nájin again in the autumn of 1998 and the last mating took place on March 5, 1999 - later that year it was confirmed that this mating got Nájin pregnant. The "Baby of Millennium" was soon to arrive.

In March 2000 Nabiré's hormonal activity and cycle was confirmed. Saút mated her for the first time on June 26, 2000.



Three months prior to the expected birth Nájin was separated from the group to get used to a new box and outdoor enclosure.

Photo: Khalil Baalbaki

Reproductive activity in the group of females after the introduction of Saút.

Nájin (born 1989)	Nabiré (born 1983)	Nesáří (born 1975)
Sept. 14, 1998 mating 20 min.	Sept. 28, 1999 interest	Sept. 3-4, 1998 interest
Sept. 28, 1998 mating > 14 min.	June 26, 2000 mating	Sept. 19, 1998 mating attempt
Oct. 28, 1998 mating > 15 min.		Aug. 12, 1999 interest
Nov. 28, 1998 mating attempt		Sept. 12, 1999 mating attempt
March 5, 1999 mating		

The birth of the Baby of Millennium



Because gestation in white rhinos differs from animal to animal and lasts between 480 and 548 days, it was very difficult to estimate the date of delivery. It could happen between late June and late August. Because Nájin's mother Nasima had twice been pregnant for exactly 485 days, we took June 29th for the first realistic date of the birth and July 2nd for the most probable date.

The Baby of Millennium was born on June 29th at 2:30 a.m. after 482 days of gestation. Thank to the Czech Radio the birth and first weeks of the calf's life as well as its first steps in the outdoor enclosure were broadcasted online from five cameras at the internet address <http://www.rozhlas.cz/mlade>.

The birth was smooth and quick. Nájin was resting down, then stood up and the youngster was born in an uncomplicated delivery within some three minutes. About half an hour after the birth Nájin tried to pick up the tiny creature with her horn – it was the first rhino newborn she saw in her life. Jan Žďárek, an experienced rhino keeper, was watching the situation and managed to keep her calm. The calf – a female as it soon turned out – was a little lighter than the average (we estimated its weight at 50 kilos) but all the more active. After Nájin relaxed, she let the youngster suckle.

The "Baby of Millennium" was not only the fourth Northern White Rhino to be born in captivity but also the first to be born in second captive generation.

Images taken by a sensitive infrared camera were distributed on the Internet and recorded on a video tape.
Footage processing: Jan Bürger



The first picture of the female with her calf was taken by a Czech Press Agency photographer Alexandra Mlejnková. For safety reasons she could take photos only after Nájin calmed down after the first feeding. The very next day these photographs were spread all over the planet.

Photo: Alexandra Mlejnková

Northern White Rhinos born in captivity – all at Dvůr Králové Zoo

No.	Sex	Studbook no. And name	Date of birth	Mother	Father	Remark
1.	M	630 Suni	June 8, 1980	Nasima	Sáut	No offspring despite mating
2.	F	789 Nabiré	Nov. 15, 1983	Nasima	Súdán	No gestation despite mating
3.	F	943 Nájin	July 11, 1989	Nasima	Súdán	The second breeding female
Abort	F	1122	July 18, 1991	Nasima	Súdán	Dropped
4.	F	1305 Fatu	June 29, 2000	Nájin	Sáut	"Baby of Millennium"

Note: M = male; F = female

Live Internet broadcast

"Shall we transmit black stork nesting again?" we were thinking at the Czech Radio early in the spring, before the storks starring in the "African Odyssey" project returned from Africa. The live broadcast called "Kristýna Live" (<http://kristyna.rozhlas.cz>) started in 1998. It was very complicated but enormously successful – tens of thousands of people from over ninety



The first tests of the equipment were done at the Zoo already in March. >From the left: Miroslav Bobek, Lubomír Piálek and Petr Rosol.

Photo: Khalil Baalbaki

countries watched the black storks Kristýna, David and their offspring. But we felt that – even while the Odyssey goes on – some brand new idea was needed.

What should it be? You can find thousands of webcams, but they lack action and meaning. To transmit the nesting of another bird species would be too similar to "Kristýna Live". To start long run watching of wild animals was out of the question.

"How about trying a Zoo?" somebody suggested. Thinking of a Zoo that keeps animals which are interesting enough for our transmission and which at the same time could benefit from the broadcast, I recalled the rhinoceroses in Dvůr Králové. But a transmission of rhinos laying for half a day in their enclosure didn't really seem attractive.

Later that day, though, I surfed the Net and started looking for details. After some half an hour I discovered an uncommon message at the International Rhino Foundation website. Professor Franz Schwarzenberger announced that a female Northern White Rhino in Dvůr Králové was pregnant and the birth was expected in the summer. Excellent!

The future "rhino team" gathered in a pizzeria near the radio headquarters the next day – the team was created out of people involved in the "African Odyssey" as well as of the staff of the newly created Czech Radio Online. Within half an hour a draft of the broadcast of the "hippos from somewhere in the mountains" was unanimously accepted.

An introductory visit at the Zoo followed (everybody soon remembered it was the "rhinos from Dvůr Králové") and then weeks of preparations started. Strong support was given hereby ESCAD Trade, the camera systems provider.

Finally in the second half of June we visited Dvůr Králové in order to install the cameras and equipment. Covering the whole area where Nájin could move (two indoor boxes and an outdoor enclosure) required five cameras. Another color camera was put above the box that was most likely to serve as a delivery room. Inasmuch as the birth was expected to happen during the night, when all the light was generated by small bulbs, we also equipped the box with a very sensitive infrared camera with remote control. Only a simple black & white camera was mounted in the adjacent box. It's easy to write about it now but it was definitely a long and windy road for our colleague Jan Petrů. One visit to the Zoo wasn't enough.

The keepers scared us during another visit on Tuesday, June 20. They found milk on Nájin's teats – it meant the baby could be born very soon. You can never forecast anything

with animals. This case seemed to be similar. We expected Nájin to have the baby in July or August but then it seemed we could easily miss the delivery! We speeded up all the preparations and launched the live broadcast on Friday June 23. Czech Telecom staff were still solving some troubles with the connection – the fifty-years old wires connecting the Zoo with the world turned out to be insufficient so new cables were installed for temporary operation.

Before the official opening of the broadcast (which took place on June 27) we launched an e-mail connection at our website where the visitors could request to be posted as soon as the birth begins. Everybody – including the keepers – felt that the previous signs were false alarm and that the baby wouldn't be born by early July. But in fact Nájin was just about to deliver her offspring.

In the evening of June 28 I entered the live broadcast website. Nájin was walking in the box, then she rest down and soon started walking again. I called Ivo Hulínský: "She's been behaving this way since early afternoon" he told me. In the meantime Jan Žďárek called from the Zoo saying that Nájin seemed very restless and would most probably deliver her baby within 24 hours. "But it's not sure, of course" he added. Several of us watched Nájin till late at night. Shall we announce that the rhino is about to be born? around 12:30 I decided to take the risk and spread the message. At 1:30 the last e-mails and SMS messages were sent to the world. A single hour later Fatu, the "Baby of Millennium", was born.



Jan Petrů of Atoll Europe installing one of the outdoor cameras. Together with ESCAD Trade staff he was in charge of the analog part of the transmission

Photo: Khalil Baalbaki



Rhino keepers' room: Ivo Hulínský, who wrote the necessary software together with Jan Bürger, is just about to launch a test of the transmission.

Photo: Khalil Baalbaki

About the Name of the Baby

After the birth, it was necessary to think of the name of the baby. The ZOO and the Czech Radio organised a public competition and asked the public - first of all radio listeners and website visitors - to send their ideas and suggestions.

More than 600 e-mails and letters arrived to the ZOO - many of the authors were inspired by the title "The Baby of Millennium" and their proposal was similar to "millennium" - Milénia, Míla, Milena, Lénia etc. One lady sent as many as 156 proposals. And finally, some of them looked for allegories and similarities, as the public was asked to suggest not only the name, but also give the reason for their choice.

It was very difficult to choose just one name. Among hot favourites, there were the names Néfaru - which means "the fourth rhino" in Swahili and Garamba, which is the name of the National Park in Congo, where these rhinos live. Finally, we choose the name FATU, which means "The Massai Queen of Eternal Life".

The name giving event took place on Wednesday, 9th August, 2000 at 11 a. m. at the



Fatu's first steps in the outdoor enclosure on July 10th. Thank to the live Internet broadcast, people all over the world could participate in the event.

Photo: Dana Holečková

enclosure of Najin and her baby, where Najin obtained a cake of fresh fruit and sunflower plants. The Director General of the Czech Radio Mr. Václav Kasík became Fatu's godfather. Among the guests, there were also the authors of the winning name "Fatu", Mr. Ondřej Bláha and his wife from Prague.



On August 9th 2000, at six weeks of age, the Baby of Millennium got her name – FATU.
Photo: Dana Holečková



What will follow?

The birth of the "Baby of Millennium" is an enormous success but also an evidence that the biggest problem of breeding white rhinos is the disturbance of their social behavior. This causes the absence of hormonal cycles in females. When females live together with males since their very young age, they do not regard them as sexual partners and their estrous mechanism is disturbed. If mated irregularly, females don't get pregnant. A group doesn't carry on breeding after the originally breeding specimens become senile – father doesn't mate his daughters and brothers don't breed their sisters. This natural protection against inbreeding is known for instance in gorillas or cheetahs, and after all also in human beings. No key to release the blockade has been discovered yet as no studies were carried to explain changes in wild rhino groups. Nevertheless, our theory that a male unknown to females should be imported and introduced to them for frequent contacts turned to be correct. Not only the change in hormonal activities and two young females being mated after Saút's comeback prove it – the best evidence is the birth of Fatu.

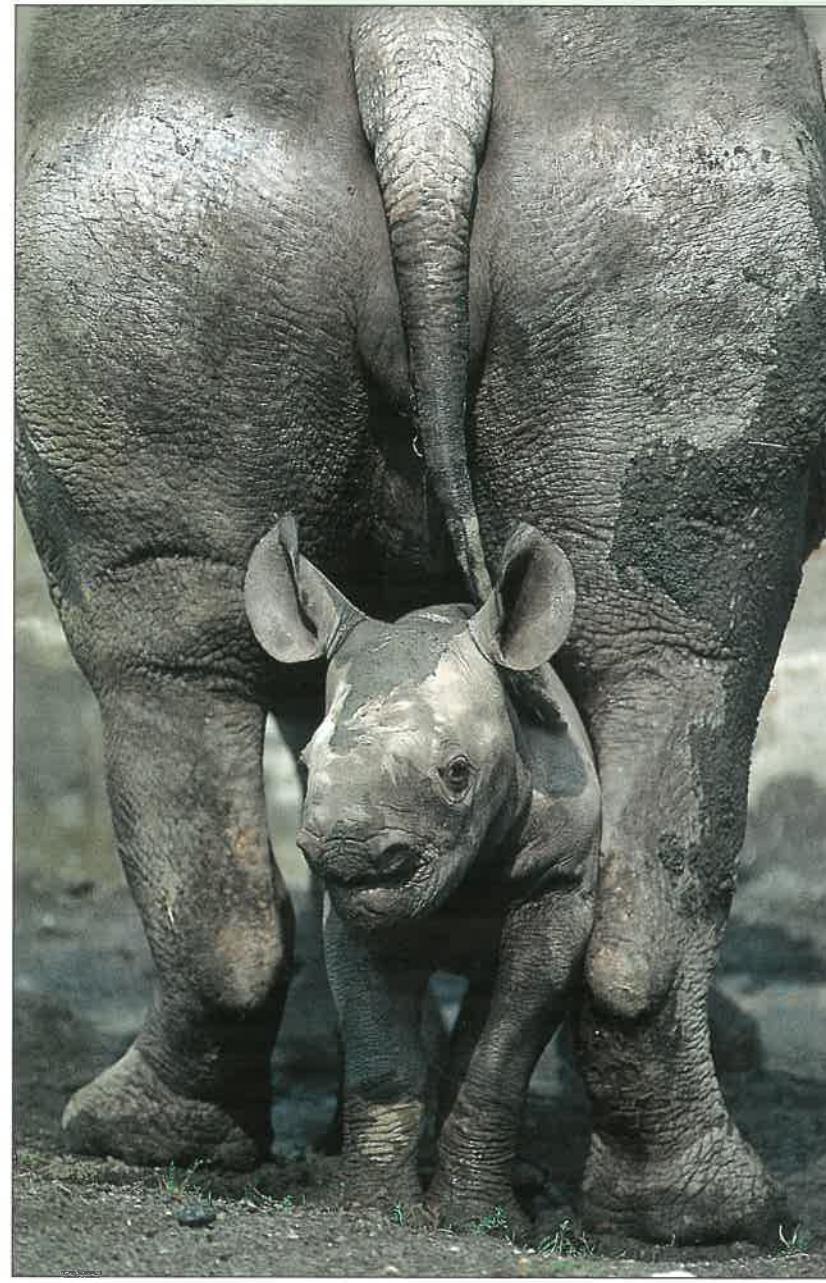
Nájin became mother at the age of nine. Because she can breed until she turns thirty, it is no exaggeration to expect her to have at least five or six more babies. If Nabiré gets pregnant as well, she herself could have three to four youngsters. Of course with the precondition that Saút remains fertile as long as he can, i.e. till the age of 35.

What about Fatu? She will certainly stay in Dvůr Králové to join the whole group together with her mother like it occurs in the wild. The presence of a youngster might stimulate other females and the calf will certainly benefit from normal social relations. When she reaches the age of four or five, we will have to solve the problem of finding the optimal partner for her. The twenty-years-old Suni, to whom Fatu is related by her grandmother, might be an option. We still hope to acquire a non-territorial (and thus not yet involved in reproduction) young male from Garamba.

Although one can never be completely sure about the future, the whole Dvůr Králové team strongly believes that there still is hope for the Northern White Rhino.

Perspectives for rhinos in the wild

An end to poaching of and trade in rhino horn will go a long way toward saving these species. When provided with protection and habitat, rhinos have demonstrated they can recover from near extinction and prosper. The case of the Southern White Rhino in South Africa and the Indian Rhino in both India and Nepal are spectacular examples. In the longer term, survival of rhino will also depend on preserving enough habitat for both rhinos and the expanding and developing human populations. This competition for space and resources between humans and rhinos (and all wildlife) will not be easy to resolve, especially in the countries where rhinos live. Conservation tourism can be very helpful. It is ever more affordable for persons from all over the world to visit Africa and Asia. African and Asian nations should, and do to some extent, promote and employ rhinos to attract tourists. But it should be developed more to ensure that rhinos can survive. In the end, preserving rhinos, the wildlife communities to which they belong, and the ecosystems they occupy will be an essential part of maintaining the ecological balance and viability of our planet on which our own human survival also depends. Until or unless we know and accept this reality, we all (rhinos and people) are in danger of extinction by human ignorance.



Female black rhino with her calf. The group kept at Dvůr Králové is the second largest captive collection of these rhinos (after Port Lympne Zoo in England)

Photo: Dana Holečková

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Zoologická zahrada Dvůr Králové nad Labem - <http://www.zoodk.cz>

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Photo: Dana Holečková

Abstract

The aim of the first part of the publication is to provide basic information on rhinos and their conservation, in the second part you will find the detailed story of breeding the Northern White Rhino (*Ceratotherium simum cottoni*) in Dvůr Králové ZOO (Czech Republic). This ZOO is the only ZOO worldwide, where this extremely endangered rhino subspecies breeds in captivity - the fourth baby was born there after 11 years, on June 29th, 2000. The birth of a female, known as the "Baby of the Millennium" has another importance - it is the first Northern White Rhino, which was captive born in the second generation. The publication provides also a detailed information on the popularization of this important event, first of all the live online broadcasting of the birth and first weeks of the baby's life by means of five cameras at the Internet address <http://www.rozhlas.cz/mlade>, which was, thanks to the support of several sponsors, organized by the Czech Radio Online. Finally, the third and last part outlines the future perspectives of rhinos and of Northern White Rhino breeding in captivity. The contemporary captive population numbers 10 individuals. During several years, there will be a need of importing a male from the wild, that means from the Garamba National Park in Congo, where about 28 last wild individuals still survive.

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ESCAD Trade and the "Baby of the Millennium"

The television system used for monitoring Najin and its young, worth CZK 450,000, was provided free of charge by ESCAD Trade. This company prepared a system proposal free of charge and assisted the staff of Atoll Europe, another project sponsor, in installing the facility.



Time-Lapse Mitsubishi video recorder.

directly from the attendant's room. With a remote controlled ZOOM lens (zoom ratio 6x), it is possible to locate and zoom in any object within a range of several tens of meters from the camera in great detail.

The monitoring station in the attendant's room was equipped with a keyboard to control camera movements and the COMPUTAR video matrix switcher, which enables switching the view from any camera to the monitor. The Time Lapse video recorder MITSUBISHI HS-7496EM was connected to the video switcher. This special video recorder makes possible a recording time of up to 96 hours on a standard four-hour VHS cassette, thus making the archiving of the recordings cheaper and simpler. Video transmission from all the cameras via Internet was provided by the VISTABOX video webserver or alternatively by a PC equipped with a special video card.



VISTABOX Video webserver from Convision.

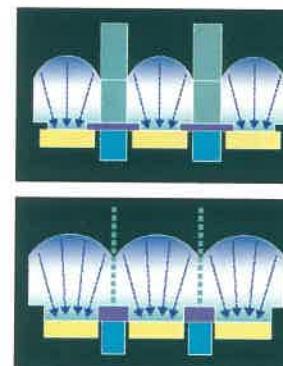
An extraordinary young shot with an extraordinary camera

And which colour camera was selected for monitoring the birth and the first weeks of the young's life in its berth? When making the selection it was necessary to meet all, often quite contradictory, requirements. The camera had to be sensitive and capable enough to shoot in twilight. The birth of the young was expected to happen at night and only weak emergency lighting, which would neither disturb the mother-to-be, nor provoke any birth complications, could be used to illuminate the nest. High resolution was a matter of course – the camera had to pick up as much image information as possible, thus providing both the attendants and the Internet public with fascinating details of the life of such a rare species. It had to be perfectly reliable – any failure would result in our having blank pages in the "young of the millennium" story. Everything was live; nothing could be rewound or repeated.

SONY's SSC-DC50AP was finally selected from among several ardent candidates and was awarded the imaginary and temporary title of the "millennium camera." Thanks to the ExwaveHAD revolutionary technology, which is used in production, this camera has increased sensitivity and is capable of substantially limiting the phenomenon called "smear," which is the vertical blurring of high-brightness spots. The camera works in high

resolution – 470 TV lines – and due to the said technology it also has a higher sensitivity in the near-infrared part of the light spectrum than is usual in colour cameras.

The principle of the ExwaveHAD technology is quite simple. Just as the human eye is equipped with a large quantity of light-sensitive cells capable of capturing incoming light, so also the CCD image sensor of each CCTV camera consists of individual light-sensitive pixels. Unlike rod-cells and cone-cells in human retina, these pixels are arranged into regular lines and columns. Light that falls between the individual sensor pixels remains unutilised. Therefore, producers of image sensors have come out with various ideas of how to limit this "dead space," thus increasing the CCD chip's effective area as well as its light sensitivity. The previous generation of SONY cameras equipped with the CCD image sensor, called



The difference in the placement of the microlenses in the HyperHAD sensor (up) and the ExwaveHAD sensor (down).

the reproduction of natural colour on an illumination by lighting sources with different colour temperatures, be it daylight, an ordinary bulb or a fluorescent lamp.

Thanks to their virtues, SONY cameras were successfully introduced in the London underground and at Expo 98 in Lisbon. In summer 2000 they took part in a unique event – the birth of the rarest Baby of the Millennium.

ExwaveHAD, HyperHAD, SmartControl and Sony are registered trademarks of the Sony Corporation.



Sony camera with the image sensor produced by ExwaveHAD technology.

Hyper HAD, solved this issue by inserting a kind of microlens over each light-sensitive pixel. The ExwaveHAD technology develops this concept to perfection: individual microlenses sit nearly on top of each other, and the ineffective surface is reduced to a minimum. This is a small technical miracle, especially if we realise that the image sensor of a half-inch format (or its sensitive surface) has dimensions of 6.3 x 4.7 mm and must accommodate almost 440,000 perfectly placed microlenses!

SONY SSC-DC50AP colour cameras are also equipped with a very effective digital circuit to compensate for back lighting, which is trademarked SmartControl. This circuit makes it possible to recognise the monitored object in the scanned image, to analyse its light parameters and to ensure an optimum gain and iris setting so that the monitored object can be displayed with all its details and not only as a black shadow. Of other functions, we could mention several different automatic white balance control modes, which make possible

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The "Baby of Millennium" project as well as the live online broadcast of the birth of the calf and its first days could never be completed without the help of the ESCAD Trade company and other partners and sponsors, above all the Czech Telecom and Cesnet (TEN-155 CZ). Many individuals have contributed to the project and we would like to thank most of all Ivo Hulínský, Ing. Jan Petrů, Magdalena Pilná, Jan Bürger, Ing. Lubomír Piálek, Ing. Petr Rosol, Ing. Andrea Růžičková, Mgr. Tomáš Bažant and Mgr. Khalil Baalbaki.

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Dr. Dana Holečková
Director, Dvůr Králové Zoo

Mgr. Miroslav Bobek
Editor-in-chief, Czech Radio Online



Photo: Dana Holečková

Name-giving to the Baby of the Millennium



The name giving event took place on August 9, 2000 at the enclosure of Najin and her baby. The Director General of the Czech Radio Mr. Václav Kasík became its godfather.

Photo: Khalil Baalbaki



The baby was in good mood, but mother Najin was a little nervous of so many visitors during the event.

Photo: Tomáš Hajný



The baby was named *FATU*, which means "The Massai Queen of Eternal Life".

Photo: Khalil Baalbaki



Ing. Ondřej Bláha from Prague was the author of the winning name "Fatu". Here he is between Ing. Václav Kasík and Dr. Dana Holečková, director of Dvůr Králové ZOO.

Photo: Tomáš Hajný

Other Rhinos in Dvůr Králové nad Labem



Of 35 rhinos born in Dvůr Králové, 24 are Black Rhinos.

Photo: Dana Holečková



The youngest offspring of Indian Rhino – female Nova and her mother at the day of her first birthday.

Photo: Dana Holečková



TITLE PHOTO: PETR JOSEK • BACK COVER PHOTO: DANA HOLEČKOVÁ