

ZOO STORY: **ARK II**



BREEDING NEW LIFE INTO ENDANGERED SPECIES

BY JULIE ANN MILLER AND DEBORAH FRANKLIN

"The beauty and genius of a work of art may be reconceived, though its first material expression be destroyed; a vanished harmony may yet again inspire the composer; but when the last individual of a race of living things breathes no more, another heaven and another earth must pass before such a one can be again." William Beebe, curator of birds, Bronx Zoo, from *The Bird, Its Form and Function* (1906)

It might be simpler, surer and less expensive to leave wild animals to carry on in their natural settings — the pandas to reproduce in forests of bamboo, gorillas in African lowlands, the Chinese alligators in lower reaches of the Yangtze River. But a hard, realistic look at the natural breeding grounds of many animals reveals that their habitats will not long survive. As when Noah paired animals on his ark to weather a natural disaster, it may be time again to collect specimens of many species in highly protected artificial sites as their only hope of survival.

Ensuring "species survival" is a relatively new goal for most zoos and aquaria. Instead of simply displaying animals to enter-

tain and educate humans, large zoos now consider animal breeding a top priority. Last year zoo officials in the United States and Canada committed themselves to developing a species survival plan to coordinate their conservation efforts. In keeping with that commitment, the annual conference of the International Union of Directors of Zoological Gardens in late September focused this year's scientific sessions on long-term management of rare animal populations in captivity.

Zoos are the most obvious places for preserving and breeding animals outside the wild. The National Zoo in Washington D.C., was designed in the original plans of 1889 to serve as a sanctuary for vanishing species, says Theodore Reed, director, but most animal parks have not shared that mission. "Now we have a decided change in attitude," Reed told *SCIENCE NEWS*. Breeding takes top priority; "postage stamp zoos" that display large numbers of animal types, one specimen each, have become less prevalent.

Reed points out pragmatic, as well as altruistic, elements of

the change in attitude. Fewer sources of wild animals and high purchase and shipping costs have reduced the supply of exotic animals from the wild. In addition, endangered species laws and quarantine regulation strictly limit animal importation so zoos' own preservation, to some extent, depends on animal breeding. Desires to preserve species for future generations and to maintain a rich genetic pool of animals that may someday be returned to the wild further shape zoo policy.

The change in direction has altered the face of many animal parks. The National Zoo nurtures only one species of zebra instead of three, a reflection of many zoos' aim to house fewer types of animals but more individuals of each species. While a few visitors complain, Reed says zoos with a limited selection of species can still adequately fulfill their educational mission of making people aware of animals as fellow creatures. At the same time researchers can specialize, devoting more time and effort to studying the animals they have.

Cooperation has replaced competition between zoos in another policy shift. "There used to be competition between them as to who had the first, the biggest, the rarest animals," Reed says. Today zoos exchange animals like library books on extended, often indefinite, breeding loans. The National Zoo currently has 200 loan agreements with 100 different institutions. Reed estimates that about 2,000 zoo animals in the United States are involved in breeding exchanges.

Not simply a provision for getting eligible males and females together, breeding loans are important safeguards against the risks of inbreeding. By reducing the genetic characteristics available to offspring, inbreeding can limit a species' chances for a successful return to the wild. But even in the short run, inbreeding can create problems for zoo animals. Katherine Rawls

of the National Zoo has studied both primates and hooved animals (SN: 12/1/79, p. 374), and finds that the most highly inbred survive the least well even in captivity. Before zoo managers became aware of the dangers of inbreeding, a single pair of prolific animals might have produced more than 100 descendants. But through breeding exchanges, all the animals of a species captive in the United States (and in some cases beyond U.S. borders) now can be considered a single breeding pool.

What are the chances of actually returning zoo-raised animals to the wild, assuming appropriate habitats are maintained or recreated? Some critics of zoo breeding programs believe the chances are slim and argue that breeding animals in captivity is equivalent to breeding animals for captivity.

Reed, however, is optimistic, citing several projects that seem to have reintroduced birds to natural habitats successfully. Large carnivorous animals will be more of a challenge, he says, because they must be trained to hunt for food. "It will take time and effort — that means manpower and money — to develop appropriate techniques," Reed says. "But the problem is not insurmountable."

The task facing those who attempt to propagate endangered species in zoos is formidable. Thousands of species may need such protection. Estimates of how many species can be saved by captive breeding efforts generally range between 100 and 200 now being bred. "You do the best you can," says Reed. "If you can't save all the animals, save a few."

Meanwhile, the task ahead has added new spirit to the nation's zoos. "For the zoo world, this is a very exciting time," Reed says. "There is so much happening, so much concern, so much cooperation and we are learning so much. There is the excitement of a challenge. We are in a race against time to save these animals." □

TAILORING CAPTIVITY TO MEET SPECIAL NEEDS

BY DEBORAH FRANKLIN AND JULIE ANN MILLER

Public enthusiasm for wildlife protection has focused on furry animals like the panda or on such ungainly birds as the California condor and the whooping crane, but protective efforts at zoos extend further into the animal world. At their annual meeting, zoo directors described breeding success and problems for a variety of endangered animals as diverse as Argentinian deer, Chinese alligators, cheetahs, boas and gorillas.

Fauna of South America have never been studied adequately, says Mark MacNamera, Associate Curator of Mammals at the New York Zoological Society. "Two species of deer from the southern Andes, the huemal and pudu, have only been investigated superficially, and yet they are disappearing in nature at an alarmingly fast rate," he reports. The pudu is the smallest true deer in the world, a stocky animal with thick legs, furry ears and a small tail. Ninety percent of its historic habitat has been occupied or cleared by man, and the few animals remaining face predation by feral dogs and an illegal pet trade. Concern for pudu survival prompted the New York Zoological Society and Argentinian Park Service and Wildlife Foundation to begin a captive breeding program in 1979.

A center to breed and study pudus was constructed in the national park that includes the highest peak in the southern Andes. There, the scientists found that a



A two-hour-old pudu nestles beneath its protective mother at a breeding center in Argentina's Nahuel Huapi National Park.

male could be introduced to several females in one rutting season and that females should be kept singly, rather than in groups, to maximize reproduction. Already, eight pudus have been born at the facility. MacNamera also studied a wild pudu population in southern Chile, but was forced to halt research last year when the site, home for at least 100 deer, was sold to a Saudi Arabian firm who stripped much of the vegetation to develop the area for agriculture.

A "desperately rare" southern Andes

deer, the huemal, is the focus of another breeding effort. Virtually nothing is known about the species, MacNamera says, although fewer than 400 members may be left. He and four Chileans mounted an expedition to the deer's remaining habitat, "an area referred to by both visitor and native alike, and certainly by me, as the end of the earth," MacNamera says.

On other continents, cheetahs, known to sprint 100 kilometers per hour as the fastest animals on land, have had a tough time outdistancing pelt hunters and farmers. Their numbers have been drastically winnowed in Africa, Asia and India in recent years. Back in the thirteenth century, Kublai Khan reportedly kept 1,000 of the sleek, spotted cats in hunting stables, but meeting the animal's need for several-hundred-acre breeding grounds has been a problem for most world zoos.

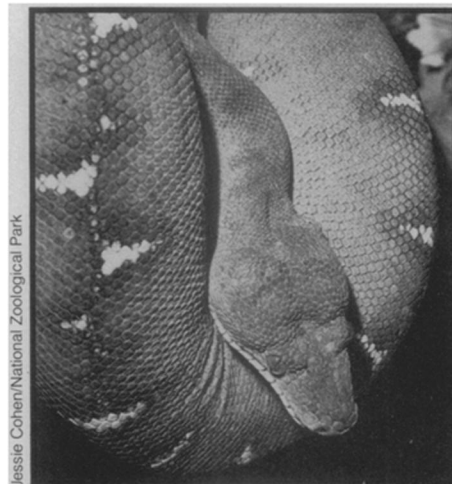
A research team from the National Zoo in Washington, D.C., and the National Institutes of Health collaborated with South African zoologists in January to study the cheetah's little-known reproductive physiology at successful breeding stations in South Africa. They also collected semen samples from the southern cats for later insemination of U.S. cheetahs.

Semen samples collected and frozen in January still seem to be viable, David Wildt of NIH reports, though the first attempts to impregnate an Omaha zoo cheetah have been unsuccessful. By experimenting with



National Zoological Gardens of South Africa, Pretoria

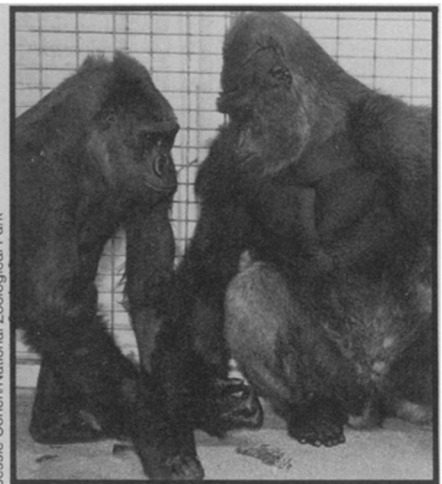
A rarer variation of a rare breed, this "King cheetah" from South Africa born last May was the first born in captivity.



Jessie Cohen/National Zoological Park



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Jessie Cohen/National Zoological Park

Strict changes in air temperature during pregnancy permit successful breeding of Emerald boas (left), while Chinese alligators (center) favor coastal marshes. Captive gorillas (right) benefit from coaching in parenting skills.

different types of "extenders" (mixtures of glycerol and nutrients used to protect the semen during freezing), and hormonal methods of artificially eliciting ovulation in cheetah females, the researchers hope to make artificial insemination a feasible option for zoos with single females or infertile males.

While mammals and birds tend to hold the spotlight, reptiles and amphibians claim a share of propagation attention in zoos. The Emerald tree boa, a South American snake with a prehensile tail, has been bred only occasionally in captivity,

but Trooper Walsh of the National Zoo reports a successful breeding program. He says the critical factors appear to be exposing the snakes to a low night temperature (17°C) for a few months and then providing gravid females with a thermal gradient, so they can stay as warm as 30°C or cool to 23°C. Three litters by two females have produced 11 living young.

The Chinese alligator has benefited from a change in captive habitat. Possibly the most threatened crocodilian species, according to John L. Behler of the New York Zoological Park, the Chinese alligator

is about half the length of its American cousin, but similar in most characteristics. Its natural habitat has been reduced to a stretch of the Yangtze River and its tributaries in China.

When the New York Zoological Society acquired a male and female Chinese alligator in the late 1950s, they assumed the pair would reproduce in the zoo's reptile house. The reptilian couple exhibited courtship and mating rituals, but the female did not nest. Finally the zoo keepers sought a "quasi-natural site" and transported the alligators to the Rocke-

feller Wildlife Refuge in the coastal marshes of southwestern Louisiana. The National Zoo contributed the only other pair of Chinese alligators in a U.S. zoo, adults that had lived in captivity, without breeding, for at least 37 years. The male of this pair died soon after the move.

Since 1976, the New York female alligator has nested each season in her Louisiana habitat, laying a total of 73 eggs. In June of 1980, the once barren National Zoo female laid 21 eggs. Behler reports that a dramatic increase in the fertility of the New York pair coincided with a dietary change.

In the case of captive gorillas, the young are often removed because the keepers do not trust an inexperienced mother with so valuable an offspring.

"The instinct of motherhood is innate in gorillas, but the mechanics are purely learned," says Warren D. Thomas, director of the Los Angeles Zoo. "Gorillas are a rare and endangered species, and we cannot run any higher risk of losing a baby than is absolutely necessary."

At the Los Angeles Zoo and several others, parenting classes for gorillas are in the offing. Some females can be conditioned to work with an animal keeper. The Los Angeles Zoo has a female that was hand-reared who has just reached sexual maturity. "Once she conceives ... we will be able to stay right with her through the birth process and can assist, if necessary, in teaching her the process of baby care.

She will then become a role model for the younger females in the adolescent family," Thomas says. "As our ultimate goal, this measure of control will get us to the point of not having to hand-raise the babies as the females should be trustworthy mothers. This particular procedure has been done in other zoos in past years."

Barely as long as a laboratory rat, the panda cub born July 21 in a Mexico City zoo was dwarfed by his 128-kilogram mother in videotapes of its birth that were played at the zoo directors' meeting. But every wiggle of the tiny cub brought smiles to conferees who were proud as parents of the only surviving giant panda born in captivity outside of China. (Another cub born to the same female last year was crushed eight days after birth by its inexperienced mother [SN: 8/23/80, p. 117], but "everything is going fine" for this year's infant, according to Jean F. Schoch, director of the Chapultepec Zoological Park in Mexico City.)

Ignorance about the panda's reproductive behavior and physiology has foiled most efforts to breed zoo pairs, but information gathered in the first large-scale field study of the animals in China may eventually make pandas as easy to breed as bears, suggests William Conway, director of the New York Zoological Society.

There, an international team of scientists is studying gnawed bamboo shoots and panda droppings as scant clues to the reclusive animal's lifestyle. Three of the

fewer than 1,000 pandas remaining in the wild have been fitted with radio-collars that permit George Schaller of the New York Zoological Society and his Chinese colleagues to track the animals' home range and daily and seasonal movement. A surprised Schaller was chased up a tree in late October by "Zhen-Zhen," one of the radio-collared pandas. Far from dismayed, the scientist was delighted to discover the source of the female's aggression: a bleating newborn addition to the Chinese study.

Stephen Seager of the National Institutes of Health collected and froze semen samples from Chinese pandas and collected detailed information from estrus females in hopes of boosting success rates of artificial insemination. While artificial insemination is a common procedure now in cattle, it requires an extensive knowledge of the candidate's reproductive systems and cycles—information often lacking in studies of exotic animals.

Finally, perhaps the most dramatic development in wild species preservation is the transfer of embryos from a rare animal to a more commonplace one. The New York Zoological Society reported in August the birth of an Indian ox, the gaur, from a domestic cow foster mother (SN: 8/22/81, p. 116). The birth established a new principle, says Theodore Reed, director of the National Zoo: Embryo transfer can be done. He predicts it will add an important weapon to the zoo's arsenal against wildlife extinction. □

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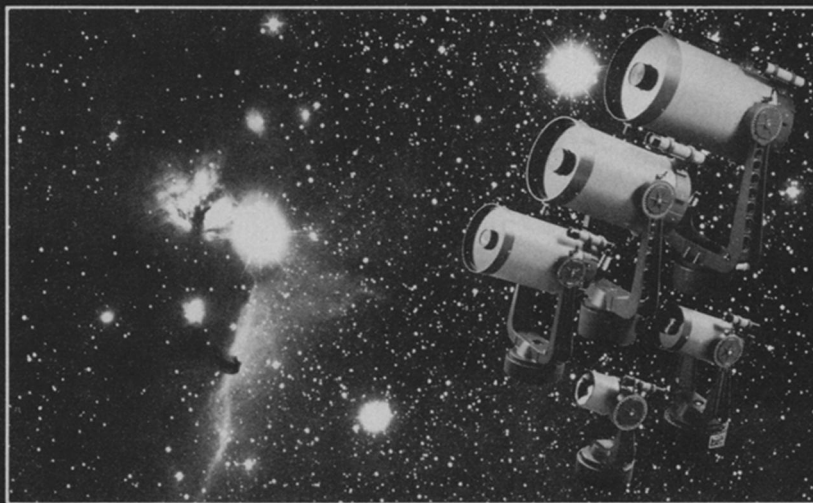
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