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Abstract: The beauty, grace, and charisma of the cheetah have motivated humankind to maintain it in captivity for millennia. Yet, throughout history, the species has sustained a reputation for being difficult to propagate. The species is even more intriguing because of some of its biological characteristics, including (1) a relatively low genetic variability, (2) an unusual ability to produce extraordinarily high numbers of structurally abnormal spermatozoa, and (3) a tendency to show few obvious behavioural clues to sexual receptivity.

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EDITORIAL

Zoos Validate an Ancient Premonition

Muta'mid Khan, a chronicler of royal happenings in 16th-century India, relates that the Mughal emperor, Akbar The Great, took at least 9,000 cheetahs from the wild during his 49-year reign, for use in sport hunting. As a boy of 13, he was first introduced to this magnificent animal, and became so taken with it that he resolved to always have cheetahs in his *shikarkhana* (royal hunting retinue). At one time, Akbar is said to have employed 200 keepers and trainers to manage a collection numbering 1,000 imperial cheetahs. Although we know nothing of the abundance of the Asiatic cheetah during the 1500s, such extravagant exploitation by Akbar and his successors was undoubtedly an early step towards its eventual extinction throughout India. Perhaps it was from a premonition of such an event that, at one point, Akbar assembled the best minds available to instruct him in captive breeding. Only a single litter was produced (apparently by a pair that got together after scaling the walls of their separate enclosures), despite such an enormous pool of captive animals, and the proffered wisdom of his intellectual advisors.

Nearly 400 years were to pass before the birth of another cheetah litter in captivity was recorded. Numerous wild species experience reduced reproduction under captive conditions, but few have been regarded as more problematic than the cheetah. This issue of *Zoo Biology* is devoted to publication of results from a recent research program undertaken by North American zoos, to try to remove some of the mystery surrounding the captive propagation of this species. The parallels with Akbar's time are evident. After more than a century of taking animals from the wild, zoos today are worried about the impending extinction of many unique life forms. Most have changed roles from exploiters to protectors of wildlife and, like Akbar, have embraced captive breeding as an adjunct to its conservation. Although success is often elusive, the contents of this issue bear testimony to the importance of scientific inquiry in understanding the biology of wild forms.

It is coincidental that publication of these reports on a problem species marks the formal affiliation of *Zoo Biology* with the American Association of Zoological Parks and Aquariums (AAZPA). I am pleased to announce that an agreement has been signed between the AAZPA and the publisher, Wiley-Liss, Inc., designating *Zoo Biology* as the official scientific journal of the Association. AAZPA members are entitled to a privileged personal subscription rate; subscription forms will be included with the annual AAZPA dues notices.

Zoo Biology was born out of a belief by its founding editor, Dr. Terry Maple,

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that enough scientific information was coming out of zoological institutions to warrant a journal dedicated to its dissemination. This first issue of 1993 marks the start of *Zoo Biology*'s 12th year of publication. Over this period of time, the journal has grown from 4 to 6 issues per year, and from 80 to 100 pages per issue. The journal has enjoyed an immense growth in support from the zoo and aquarium community. The new affiliation with the AAZPA is a major step towards improving the educational, conservation, and exhibitry functions of its member institutions, for it represents tacit recognition of the need to increasingly rest these endeavors on information generated through utilization of scientific methods.

Though a large step for zoos and aquariums has been taken by this act, it is against a background of uncertainty about the future of our planet that we may yet wonder if "the world will little note, nor long remember, what we say here." Recently, the Union of Concerned Scientists, in a report bearing 1,575 signatures from 69 countries, warned that the unchecked growth of *Homo sapiens* over the next 5 to 6 decades will most likely alter the planet's capacity to sustain life as we know it today. Past crises such as world wars and humankind's propensity for treading to the brink of nuclear obliteration have occurred with oceans and atmospheres and forests and grasslands still reasonably intact. The ebbing of the threat in each case brought a return to an admittedly different, yet reasonably sustainable life style. Now, our greatest worry should be that the option of returning to normal may, in the aftermath of the approaching population crisis, be beyond the pale. Considering that our species, the ultimate in flexible behavior, is placing its own well-being in peril, what chance do zoos and aquariums have in making a meaningful difference in efforts to secure the future for oppressed wildlife?

Paleontologists have often pointed out that the cumulative impact of many small steps appear, over the vast expanse of geological time, as relatively major. While we are thinking decades rather than epochs in the present case, we nevertheless must validate the importance of the small steps that are within our power to take. For, in combination with the many efforts to save habitat and control human population growth, there may yet be time for zoos and aquariums to play a role in helping to avoid a world that none of us wants. Bringing association sanction to the increasingly important role of scientific information in the captive keeping of wildlife is a highly significant act, for which the leaders of the AAZPA deserve to be commended. If he could know of it, I think Akbar would have said "They've got the right idea."

Donald G. Lindburg
Editor

Zoo Biology 12:3–4 (1993)

INTRODUCTION

Basic Research and the Cheetah SSP Program

One feature of any successful captive breeding program is the consistent production of healthy offspring capable of contributing to long-term species preservation. In addition to being charged with this "applied" responsibility, we as wildlife managers also must understand exactly why a particular species either succeeds or fails to thrive in captivity. It simply is not enough to enjoy the ability of some species to reproduce easily and at will—understanding the reason for success in one species eventually may lead to overcoming reproductive problems in another. Basic research holds tremendous promise for dealing with the many species that elude consistent reproduction in zoos. Historically, an animal failing to breed simply has been introduced to a variety of possible mates, until compatibility (hopefully) occurs. However, with programs relying more and more upon mandated breedings of specific, genotypically-distinct individuals, we can no longer afford to randomly pair animals until successful natural mating occurs. There is a need to focus more systematic attention upon understanding the *causes* of reproductive success and failure in captive wildlife populations.

The time is exactly right for more organized, basic research efforts in zoo-maintained, endangered species. The advent of Species Survival Plans (SSPs), which allow managing entire regional animal collections, encourages and facilitates the ability to achieve high quality science. Certainly, having access to perhaps hundreds of animals through an SSP-sanctioned research project makes for a larger and more sound data-base than trying to interpret limited data collected from a few individuals in a single, isolated zoo.

All of these considerations are important in the context of this special issue of *Zoo Biology* dedicated to the cheetah. The beauty, grace, and charisma of the cheetah have motivated humankind to maintain it in captivity for millenia. Yet, throughout history, the species has sustained a reputation for being difficult to propagate. A few institutions have succeeded, but many more have failed or experienced mixed results. And all too often, the "success" of some institutions has been based upon only one or two breeding animals. The species is even more intriguing because of some of its (by now well-known) biological characteristics, including (1) a relatively low genetic variability, (2) an unusual ability to produce extraordinarily high numbers of structurally-abnormal spermatozoa, and (3) a tendency to show few obvious behavioral clues to sexual receptivity.

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