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Abstract: Throughout history, the cheetah has sustained the reputations for being difficult to propagate in captivity. In 1988, at its mid-years meeting in Kansas City, the SSP Committee mandated that all cheetahs in North America be designated as a research population and decided to implement and manage a systematic research program focusing upon basic reproduction, genetics, behaviour, nutrition, and disease.

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

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 millennia. 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.

All of these factors, combined with a universal frustration to generate a self-sustaining captive population, motivated the Cheetah SSP Propagation Committee to make a rather revolutionary decision in 1988. At its mid-year meeting in Kansas City, the SSP Committee mandated that all cheetahs in North America be designated as a research population. The SSP objectives changed. No longer would primary emphasis be placed upon the traditional goal of producing a self-sustaining, viable population. Rather, the SSP decided to implement and manage a systematic research program focusing upon basic reproduction, genetics, behavior, nutrition, and disease. The logic was simple—the cheetah is a highly specialized species with unique genetic, reproductive, and perhaps other, as yet undefined traits. Initiate research to understand the fundamental biology of the cheetah, and the key(s) to better management will be found.

The program was started with no illusions—the SSP understood (and continues to believe) that it will require years of longitudinal and multidisciplinary studies to answer the obvious questions. Nevertheless, the SSP took this important and precedent-setting first step. The development of an individual species-oriented research program, organized across disciplines and among diverse institutions, has produced an impressive data set, as this *Zoo Biology* issue attests. Papers address the demographics, health, and reproductive status of the North American cheetah population; new discoveries in basic cheetah biology; the latest information on disease prevalence; nutritional considerations; and factors related to reproductive success in free-living cheetahs. The information contained within these first manuscripts was generated in a relatively short time, illustrating the potential power of a coordinated SSP effort to systematically create excellent science while solving practical problems. The completed answer as to why cheetahs are reproductively inefficient in zoos will not be found in this issue. But the information contained herein is an important first step, and attends to what recently has been termed “reality-based conservation,” the collection and assimilation of any and all information ultimately useful for enhancing the preservation of a species [Wildt et al., 1992]. Lastly, we hope that this effort will serve as a useful model for other SSP programs facing similar challenges.

David E. Wildt, Guest Editor
National Zoological Park
Washington, DC

Jack Grisham, Cheetah SSP Coordinator
Oklahoma City Zoo
Oklahoma City

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RESEARCH ARTICLES

Captive Breeding of Cheetahs in North American Zoos: 1987-1991

Laurie Marker-Kraus and Jack Grisham

NOAHS Center, National Zoological Park, Washington, DC, and Cheetah Conservation Fund, International Wilderness Leadership Fund, Fort Collins, Colorado, and Namibia, Africa (L.M.-K.), and Oklahoma City Zoological Park, Oklahoma City, Oklahoma (J.G.)

From 1987 to 1991, the North American captive cheetah population increased by 38% (to 266 animals), due to importation and captive breeding. This population constitutes 26% of the world's captive cheetahs and 36% of all reproductively successful animals. Since 1956, 33% of all cubs born in North America occurred during this 5-year period. Because of importation of animals from breeding programs abroad, East African (*A. jubatus raineyi*) genes have been introduced into the North American cheetah population, and 39% of all cubs born during 1987-1991 were South African/East African hybrids. Also during this time, the breeding population and effective breeding population increased by 86% and 72.6%, respectively. The incidence of infant mortality decreased from 37% (last recorded for the years 1956 to 1986) to 28% (averaged over 5 years), although infant mortality during the latter period ranged from 15% (for unrelated parents) to 41% (for related parents). Management recommendations implemented to increase fecundity and population size appear to be successful, although the founder base of the population still has only been increased from 52 cheetahs in 1986 to 72 animals in 1991. © 1993 Wiley-Liss, Inc.

Key words: studbook, pedigree analysis, *Acinonyx jubatus*

INTRODUCTION

Once widely distributed throughout western Asia and Africa, the free-living cheetah population was estimated to be 100,000 animals in 1900 [Myers, 1975]. Today between 9,000 and 12,000 free-ranging cheetahs remain, according to anecdotal estimates, with the largest concentration in southern Africa and fewer than 200 individuals in Iran. Although cheetahs inhabit a broad section of Africa (including parts of North Africa, Sahel, and eastern and southern Africa), the overall continental

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Address reprint requests to Jack Grisham, General Curator, Oklahoma City Zoological Park, 2101 Northeast 50th Street, Oklahoma City, OK 73111.