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Abstract: Cheetah breeding program in Crandon Park Zoological Garden. In cooperation with a private cheetah owner, the staff of the Crandon Park Zoo initiated a captive breeding program for the cheetah in 1974. This report covers the progress of this program from its inception in July 1974 until the end of March 1975. This is the first phase of a continuing program. Considerable effort has gone into determining what conditions are conducive to successful cheetah breeding. The field of what seemed to be necessary conditions in the earlier programs has been narrowed down by observations in the more recent programs.

CRANDON PARK ZOOLOGICAL GARDEN
RESEARCH & SPECIAL PROJECTS OFFICE

INFORMATIONAL REPORT

CHEETAH BREEDING PROGRAM

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Introduction and Review

In cooperation with a private cheetah owner - Lance Giller - the staff of the Crandon Park Zoo initiated a captive breeding program for the cheetah, Acinonyx jubatus, in July 1974. This report covers the progress of this program from its inception in July 1974 until the end of March 1975. This is the first phase of a continuing program.

A review of previous cheetah breeding programs at other zoos is unnecessary since there are three published reports that adequately review and summarize these programs :

1. Reproduction in Captive Cheetah Seminar, AAZPA publication printed by the Oklahoma City Zoo, 1972, 19 pp.
2. Survey of Conditions Associated with Breeding Cheetah in Captivity, Robert A. Thompson and Bedford Vestal, Zoo Journal 2(3): 1-21, 1974. Publication of the Oklahoma City Zoo.
3. Cheetahs (Acinonyx jubatus) in Captivity, H. van de Werken, Special Information 1, Royal Zoological Society, Natura Artis Magistra, Plantage Kerklaan 40 Amsterdam, Nederland, 1975, 19 pp.

Crandon Park Zoo Program Summary

Considerable effort has gone into determining what conditions are conducive to successful cheetah breeding. The field of what seemed to be necessary conditions in the earlier programs has been narrowed down by observations in the more recent programs. I consider the following conditions to be necessary to successful cheetah breeding (= birth of cubs that are raised by the mother to an age of at least eight weeks old - an age at which they should be weaned). The following conditions agree, for the most part, with those found to be necessary in the second and third reports listed in the Introduction. And because these conditions occurred in the Crandon Park Zoo program, they are given here as a summary of our program :

1. Pair bond. Most of the cheetahs we put together during this program were compatible; however, the two cheetahs that bred successfully had a breeding compatibility or pair bond that did not seem to exist between the others. It should be noted that the sex ratio may be insignificant for this reason (it appeared so in our program).
2. Unfamiliarity and/or separation. Individuals used for breeding should be completely unfamiliar with one another or they should be completely separated for several months.
3. Season. Recognition of heat and the introduction of the cheetahs when the female is in heat is important. There seems to be a July-August and December-January pattern of seasonality of estrus with minor variations. Our cheetahs bred from July, when they were first introduced, until October when the female became pregnant. I also believe one of our females was in heat during January, but we could not move her to the male in time and she went out of heat soon after introduction. When the females were not in heat the cheetahs did not pay attention to one another, and therefore, no breeding occurred.
4. Age. An age of at least three years seems to be necessary. Although cheetahs are sexually mature at 14-16 months (Notes on the Reproductive Biology of the Cheetah, Randall L. Eaton, International Zoo Yearbook 10: 86-89, 1970) the median estimated age of those breeding cheetahs in previous programs is four years. Our breeding pair was 3.5 (male) and 4.5 (female) years old. Our male that did not breed was 3 years old.
5. Exhibit location. The only condition necessary seems to be that the exhibit (or area where breeding occurs) should not be near other carnivore exhibits. Our cheetah exhibit where the breeding activity occurred is not near other carnivores; however, when we held individual cheetahs in pens near large felids, they showed obvious signs of stress (refer to the end of the BEHAVIOR notes*). Our exhibit was outdoors and allowed for good long distance viewing of the environment by the cheetah, although there were no high mounds.

6. Isolation of pregnant female. As in our program, the pregnant female should be removed as soon as possible and isolated. After the cubs are born she should be able to get out, away from the cubs for short periods of time to exercise. This is particularly important to cub survival and thus, a successful breeding as defined earlier.

Crandon Park Zoo Program Chronological Listing of Events

The cheetahs involved in the program (there are 2.6 altogether) :

Boy (CPZ)	male	arrived 25 FEB 1972 at 10-12 months age
Romeo (LG)	male	arrived 08 MAR 1972 at 6 months age
Girl (CPZ)	female	arrived 25 FEB 1972 at 10-12 months age
Tammy (LG)	female	arrived 18 JAN 1972 at 24 months age
Sara (LG)	female	arrived 07 MAR 1970 at 8 months age

CPZ = Crandon Park Zoo LG = Lance Giller

1973-APR 1974 occasional breeding attempts between the CPZ cheetahs have been observed as have breeding attempts between the LG cheetahs

06 APR 74 separation of the CPZ cheetahs and preparation for
 22 JUN 74 LG cheetahs that are to be brought to CPZ for breeding.
 23 JUN 74 Boy is put in the cheetah exhibit and Girl is put in a holding pen in the cat area

26 JUN 74 Tammy brought to CPZ from LG facility

12 JUL 74 Boy & Tammy introduced at 10:00 AM; breeding observed at 11:45 AM and 3:53 PM

21 JUL 74 Boy & Tammy separated

08 AUG 74 Sara brought to CPZ from LG facility

09 AUG 74 Boy & Sara introduced

19 AUG 74 Boy & Sara breeding observed

02 SEP 74 Boy & Sara breeding observed

03 SEP 74 Boy & Sara breeding observed

12 OCT 74 Boy & Sara separated
 Boy & Tammy re-introduced

10 NOV 74 Sara introduced to Boy & Tammy

16 DEC 74	Sara & Tammy	separated from Boy and returned to LG facility
23 DEC 74	Romeo	brought to CPZ from LG facility
10 JAN 75	Boy & Romeo	introduced; severe fighting; separated
27 JAN 75	CHEETAH BIRTH	2.3 cubs born to Tammy (and Boy) at LG facility
03 FEB 75	Girl	moved from cat area to exhibit
	Boy	moved from exhibit to cat area
	Romeo	kept in exhibit adjacent to Girl
06 FEB 75	Boy	moved from cat area back to exhibit (all three cheetahs are separated in different parts of the exhibit) - refer to the end of the BEHAVIOR notes*
12 FEB 75	Romeo & Girl	introduced; some fighting; no observed breeding; separated
14 FEB 75	Romeo & Girl	re-introduced; fighting; separated
	Boy & Girl	re-introduced (introduced for the first time as part of this program)
28 MAR 75	Boy & Girl	still together
	Romeo	separated from Boy & Girl. Romeo will be returned to LG facility and Boy & Girl will be separated
28 MAR 75	at the date of this report all of the cubs have been successfully raised and are doing fine. We do not anticipate any further breeding until July, at which time our continuing program will enter its second phase. A continuing program is necessary in order to determine if the program is going to be successful, for I feel several successful births should occur before a program of this nature is considered to be successful.	

Conditions Associated with the Crandon Park Zoo Cheetah Birth

1. FACILITIES

- a. The CPZ cheetah exhibit (including main pen, side pen and shelter area - refer to Diagram 1) is located outdoors. The LG facility is also outdoors (refer to Diagram 2).
- b. The main pen of the CPZ cheetah exhibit (where all breeding occurred) is about 341 sq. m. (3600 sq. ft.). The LG facility is about 3973 sq.m. (42000 sq.ft.).

- c. The CPZ cheetah exhibit is not near any carnivore exhibit and it allows the cheetahs a long distance view of the exhibits surrounding environment.
- d. The CPZ cheetah exhibit is on view to the public. The IG facility is not.
- e. The CPZ cheetah exhibits natural soil and grass substrate is flat with no high mounds and only a couple of palm trees. The IG facility substrate is muck and heavy grass with several trees and one high mound.

2. BREEDING

- a. Boy and Tammy were each in captivity about 2.5 years when the first breeding occurred.
- b. Boy was in the CPZ cheetah exhibit about 3 weeks; Tammy about 2 weeks, prior to the first breeding.
- c. The estimated age at the time of breeding was 3.5 years for Boy and 4.5 years for Tammy.
- d. All of the CPZ and IG cheetahs have good handling dispositions although they are not actually touched.
- e. Sex ratios :

July	1 male/1 female	Boy & Tammy
August	1 male/1 female	Boy & Sara
October**	1 male/1 female	Boy & Tammy
November	1 male/2 female	Boy, Tammy & Sara
February	1 male/1 female	Romeo & Girl
February	1 male/1 female	Boy & Girl

**Tammy became pregnant

- f. Boy was completely unfamiliar with Tammy and Sara; breeding occurred immediately upon the introduction of Boy and Tammy, but it was a few days before breeding was observed between Boy and Sara. Romeo was completely unfamiliar with Girl; no observed breeding - they were not compatible. Boy and Girl were separated for 8 months before they were re-introduced during this program.

3. BEHAVIOR

- a. Successful breeding occurred when Tammy was re-introduced to Boy in October 1974, giving a possible gestation period of 107 days or less. (Successful breeding did not occur during the first introduction in July 1974, for Tammy was separated after this first introduction for 3 months before being re-introduced to Boy and she did not show any signs of pregnancy. Neither did Tammy become pregnant when a second female, Sara, was introduced to her and Boy in November 1974, for this would only give a gestation period of 80 days.)
- b. Breeding on the first day of the program occurred at 11:45 AM and 3:53 PM. The other times in which breeding was observed, the times were not noted.
- c. Signs of estrus included rolling over and other, more subtle behavioral changes (in the presence of a male - otherwise there are virtually no noticeable changes). However, in order to perceive these subtle changes, one must have a special relationship with the cheetahs so that one knows every aspect of their behavior and their individual personalities. No external breeding stimulus was required to get the male to breed.
- d. General behavioral observations : Before introducing Boy and Tammy we allowed them to take turns being in the main pen so that neither would be possessive of it. When introduced, the male did a great deal of sniffing (as did the female) and he marked the palm trees, shelter area and perimeter fence. He also built mounds out of grass and dirt (some contained fecal material). No other cheetahs were observed building these mounds. Soon after the introduction, the male began following the female around the pen and both cheetahs chirped to one another. This following usually began as a walk and ended in a chase with the male catching the female and pulling her to the ground by putting his leg on her back. The first breeding attempt was more educational than successful, occurring only 1 hour and 45 minutes after the introduction. The second attempt took place 4 hours after the introduction and was more successful. The first attempt took place

moved back to the cheetah exhibit. While behind the tigers he went off feed, he was not urinating, he paced continuously, his back legs went limp and he was under a great deal of stress.

Unfortunately a great deal of detailed behavioral information is missing from the above accounts; however, we were unable to have an individual devote their full time to studying the cheetahs behavior.

4. BIRTH

- a. The first and only birth to date occurred on 27 JAN 75, six months after the program was initiated.
- b. The cubs were born between 11:00 PM (26 JAN) and 6:00 AM (27 JAN).
- c. The mother, Tammy, and the cubs were isolated at the LG facility. A den was provided and used (a wooden crate inside a road fence perimeter - refer to Diagram 2). Tammy is let out of the den area each day so that it can be cleaned and so that she can exercise and interact with the other LG female cheetahs. She returns on her own and is very protective of the cubs. A great deal of chirping and peeping occurs between Tammy and the cubs.
- d. The 2.3 cubs are being raised by the mother.
- e. The only medical problems with the cubs have been roundworms (treated 14 MAR 75) and the loss of clarity in the cornea of one of the cubs (successfully treated). The eyes were open at two days of age.

5. HUSBANDRY AND FEEDING

- a. The main diet of the CPZ cheetahs is Nebraska Brand Feline Diet. The main diet of the LG cheetahs is ZuPreem Feline Diet. Both of these are nutritionally complete commercially prepared diets; however, they are supplemented with freshly killed, whole, plucked chicken; rabbit; and chicken necks.
- b. There were no dietary changes prior to breeding.
- c. Only on rare occasions were live rabbits fed, the cheetahs knowing how to kill them; however, I do not feel that this method of feeding stimulated breeding nor was necessary to do so.