Second Cat Conference

The Second International Symposium on the Ecology, Behavior, and Conservation of the World's Cats emphasized research on the reproduction of felids as a means of preserving endangered species. Many felids are rare or endangered and most felid populations appear to be declining in number. Moreover, many species have poor reproductive histories when reared in captivity. It may be possible to reintroduce stock bred in captivity into the wild. Therefore, zoos must be able to maintain reproducing populations which are genetically viable and capable of adapting to a life in the wild.

A study of the reproductive biology and mating system of the African lion (*Panthera leo*) was discussed by R. L. Eaton. Lions have a relatively low probability of conception; only 23 percent of the estrous periods observed resulted in known pregnancies. Probability of conception did not correlate with the number of males mated in an estrus or with the length of estrus. However, during a synchronous series of estrous periods in one pride, the first females to enter estrus showed the highest probability of conception. Synchrony of mating within prides was shown to be a nonrandom phenomenon.

There was a positive correlation between the status of females in a pride and their ability to raise young. Dominance in males was correlated with mating order. The phenomenon of a female mating with more than one male in an estrus, and the occurrence of many estrous periods which do not result in births, is unexplained. It is conceivable that, by providing a male with sexual gratification, females reinforce the male's bond to the pride; however, this and other explanations cannot be tested until the female and male reproductive organs are studied at different stages of the cycle.

The first investigation of normal physiological parameters in a wild felid was conducted by R. Morse (Georgia Medical College), who died prior to the meeting. T. B. Follis (World Wildlife Safari) was continuing Morse's study on the young adult lions, and he prepared their combined data for presentation.

Two lions were studied for 20 months and data on 14 parameters were compiled. From the age of 2 weeks to 18 months, the lions were hand raised; they then lived with other lions in a seminatural paddock. During the period of study, there were two rapid increases in growth from nose to tip of tail, which indicate a specific growth of the spinal column, unaccompanied by an increase in weight. Weight gain was nearly the same for the male and female until 53 weeks of age, when the female gained at a slower rate. Blood creatinine increased in concentration with age in accordance with an increase in muscle mass. Concentrations of blood alkaline phosphate decreased. Both of these changes appeared to be normal occurrences. Concentrations of other blood chemicals were stable regardless of the age of the animal.

A common problem recognized throughout the meeting was the difficulty of determining origins of animals. Incorrect specifications of geographic origins as well as erroneous identifications of subspecies bred in captivity may alter study results. Everyone agreed that zoos and animal dealers must keep more complete records, and that each animal must be permanently identifiable.

R. F. Sadleir (Simon Fraser University) described two approaches to research in felid reproduction: namely, the eco-ethological approach, in which attempts are made to breed species under captive conditions by duplicating conditions in the wild; and the physiological induction approach, which includes artificial insemination, induced ovulation, and preservation and transport of semen. Sadleir believes that both approaches must continue as must further field studies, but that we may have little time to study these endangered species in the wild.

R. F. Ewer (Smithsonian Tropical Research Unit, Panama) feels that the eco-ethological approach of natural duplication is essential since we do not know what genetic changes take place during physiological induction. Such genetic changes could result in stock incapable of survival in the wild. Eaton commented that field studies are likely to become subordinate to research in artificial techniques.

The value was recognized of being able to send a small vial of semen, as opposed to the male, for use in artificial insemination. Sadleir criticized zoos for not transmitting information and animals.

During the session on behavior, Ewer related viverrid behavior to the evolution of reproductive behavior in the Felidae. Civets and genets are believed to closely resemble ancestral felids. The crouched posture exhibited by felids in copulation is an aberrant form among mammals, and appears to be derived from arboreality in which mating occurred in trees. It has been retained in terrestrial felids because it minimizes risk to the female. Since felids can kill effectively with one bite, this copulatory posture reduces the chance of the female being responded to as prey.

Ewer discussed the complex behavioral pattern of felids in which the mother's killing behavior becomes inhibited and she creates situations in which the young can experience prey killing, without much danger from the prey. Inhibition in the mother felid occurs gradually as the young approach weaning. However, the civets are much more generalized feeders, seldom preying on potentially dangerous animals. The young continue to receive nourishment by suckling long enough for them to develop prey catching skills without maternal assistance.

Mating behavior in the bobcat (*Lynx rufus*) was first studied by C. M. McCord (Massachusetts Cooperative Wildlife Research Unit) who interpreted behavior by tracking bobcats in snow. McCord clipped the toes of the cats and was thus able to identify the tracks of individual cats, and thereby distinguish male and female cats. Bobcats used considerable space in courting and indicated a preference to copulate in wooded areas. McCord's data lead him to suggest that the bobcat is polygamous or promiscuous. Of particular interest was the apparently cooperative hunting of a mating pair, and the courtship play that made use of a gray squirrel.

Ewer led a discussion of the evolution of mating systems in the Felidae. One of the chief problems, according to Sadleir, is that interpolations are made from a biased collection of studies, which to date have concentrated on the larger and sometimes more social species. C. Wemmer (Brookfield Zoo) argued that until more is known of the social organization of prehistoric cats, such as the sabertooth, we will not know if sociability is primitive or advanced. Ewer and Wemmer agreed that the size of kills made by sabertooths would favor sociability in the face of competing predators; however, in one highly social modern cat, the lion, sexual dimorphism is particularly pronounced. For example, the size

of the canines of lions shows a bimodal distribution. Ewer's examination of sabertooth canines revealed no separation of sexes. The discussants concluded that until more is known of the many smaller felids, an understanding of mating patterns in felids will largely be speculative.

Propagation and management of captive species is important to managers of zoos. R. Thompson (University of Oklahoma and Oklahoma City Zoo) reviewed reproductive success in captive cheetahs. Thompson's final consensus was that until zoos publish the conditions associated with unsuccessful breeding attempts, it is impossible to determine what factors, if any, favor success in captive propagation.

Basing his models on extensive research with house cats, E. Colby (Dartmouth Medical School) developed techniques that enable him to artificially induce estrus in the bobcat. This has opened the door to achieving reproduction by totally artificial methods. S. Seager (Oregon Medical School) reported on his counterpart research in collection and storage of semen.

D. Shorey and Eaton (World Wildlife Safari) reported on the behavior and management of Bengal tigers (*Panthera tigris*) in the first seminatural habitat designed for this species. The unsociability of tigers was reflected in their partitioning of space. Of significance to zoo management were the observations of tigers daily eating grass, suggesting that zoo tigers may require grass on a regular basis.

In the more confined condition of many conventional zoos, stress is often exhibited by pairs of unsociable species housed together in the same cages. Apparent anxiety often appears in females about to give birth, resulting in obstruction of proper maternal care. In an attempt to solve these and related problems, J. W. Foster (Woodland Park Zoo) conducted experiments using Psymod, a mild tranquilizer. His data are inconclusive, but it would appear that Psymod is grossly superior to other tranquilizers in that it does not interfere with feeding and drinking.

The conference was sponsored by World Wildlife Safari, Winston, Oregon, and Institute for the Study and Conservation of Endangered Species, Athens, Georgia, and was held on 3 to 5 May 1973 in Winston, Oregon.

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Forthcoming Events

August

4–9. Conference on **Safety of Small Dams**, Engineering Foundation, Henniker, N.H. (EF, 345 E. 47 St., New York 10017)

5–8. **Potato** Assoc. of America, Pasco, Wash. (H. J. Murphy, 114 Deering Hall, Univ. of Maine, Orono 04473)

5–8. **Poultry Science** Assoc., Morgantown, W.Va. (C. B. Ryan, Dept. of Poultry Science, Texas A&M Univ. College Station 77843)

5–9. **Molecular Biology and Pathology**, 7th annual conf., Saratoga Springs, N.Y. (K. T. Lee, Dept. of Pathology, Albany Medical College, Albany, N.Y. 12208)

5–10. World Conf. on **Medical Informatics** (1st), jointly with Intern. Federation for **Information Processing** (6th triennial), sponsored by IFIP's Technical Committee for Information Processing Medicine, Stockholm, Sweden. (F. E. Heart, Bolt Beranek and Newman, Inc., 50 Moulton St., Cambridge, Mass. 02138)

7–9. **Applications of X-ray Analysis**, 23rd annual, Metallurgy and Materials Science Div., Denver, Colo. (C. O. Ruud, MMSD, Denver Research Inst., Univ. of Denver, Denver 80210)

10–13. **Soil Conservation** Soc. of America, Syracuse, N.Y. (H. W. Pritchard, SCSA, 7515 Northeast Ankeny Rd., Ankeny, Iowa 50021)

10–18. National **Speleological** Soc., Decorah, Iowa. (L. A. Klein, Apt. 18-0, 98-30 57th Ave., Flushing, N.Y. 11368)

11–14. **Conservation Education** Assoc., 21st annual conf., Syracuse, N.Y. (D. L. Hanselman, College of Environmental Science and Forestry, State Univ. of New York, Syracuse 13210)

11–14. **Genetics** Soc. of America, Bloomington, Ind. (B. H. Judd, Dept. of Zoology, Univ. of Texas, Austin 78712)

11–15. American **Physiological** Soc., Albany, N.Y. (O. E. Reynolds, APS, 9650 Rockville Pike, Bethesda, Md. 20014)

11–16. American Acad. of **Clinical Toxicology**, jointly with Canadian Acad. of Clinical and Analytical Toxicology and La Soc. Française de Toxicologie Clinique, Montreal, P.Q., Canada. (J. E. Ott, Univ. of Colorado Medical Center, 4200 E. Ninth Ave., Denver, Colo. 80220)

11–16. Society for **Industrial Microbiology**, Memphis, Tenn. (W. M. Stark, Lilly Research Labs., Eli Lilly & Co., Indianapolis, Ind. 46206)

11–16. American **Phytopathological** Soc., Vancouver, B.C., Canada. (R. J. Tarleton, APS, 3340 Pilot Knob Rd., St. Paul, Minn. 55121)

11–16. Conference on **Subsurface Exploration for Underground Excavation and Heavy Construction**, Engineering Foundation, Henniker, N.H. (EF, 345 E. 47 St., New York 10017)

11–17. American Soc. for **Horticultural Science**, Guelph, Ont., Canada. (C. Blackwell, ASHS, P.O. Box 109, St. Joseph, Mich. 49085)

12–14. Conference on **Research, Test and Training Reactors**, American Nuclear Soc., Charlottesville, Va. (J. L. Meen, Jr., Dept. of Nuclear Engineering, Univ. of Virginia, Charlottesville)

12–15. American **Hospital** Assoc., Chicago, Ill. (J. A. McMahon, 840 N. Lake Shore Dr., Chicago 60611)

12–15. Associated **Public Safety Communications** Officers, 40th, San Diego, Calif. (S. Lane, Public Safety Systems Inc., P.O. Box 30410, Santa Barbara, Calif. 93105)

12–19. International Congr. of **Acarology**, 4th, Saalfelden, Austria. (E. Piffl, ICA, Zoological Inst., Univ. of Wien, Dr. Karl Lueger-ring 1, Wien I, Austria)

12–26. International Conf. on **Social Science and Medicine**, 4th, Elsinore, Denmark. (P. J. M. McEwan, Center for Social Research, Univ. of Sussex Falmer, Brighton, Sussex, England)

13–15. **Pattern Recognition**, 2nd intern. conf., Inst. of Electrical and Electronics Engineers, Computer Soc., Copenhagen, Denmark. (E. Backer, Electrical Engineering Dept., Delft Univ. of Technology, Delft, Netherlands)

13–16. Canadian Assoc. for **Laboratory Animal Science**, Saskatoon, Sask., Canada. (F. M. Loew, Animal Resources Centre, Univ. of Saskatchewan, Saskatoon S7N 0W0)

13–16. Institute of **Mathematical Statistics**, Edmonton, Canada. (G. J. Resnikoff, Office of Graduate Studies, California State Univ., Hayward 94542)

14–16. **Electron Microscopy** Soc. of America, St. Louis, Mo. (G. G. Cocks, Olin Hall, Cornell Univ., Ithaca, N.Y. 14850)

14–16. Society of **Protozoologists**, Middletown, Conn. (R. B. McGhee, Dept. of Zoology, Univ. of Georgia, Athens 30601)

14–17. Colombian **Internal Medicine** Congr., 3rd., Medellín. (W. Rojas, CIMC, Aptdo Aéreo 30-31, Medellín)

14–23. World Council for the **Welfare of the Blind**, General Assembly, Brasilia, Brazil. (World Council, 45 Ave. Bosquet, 75 Paris 7, France)

16–18. Association of Philippine **Practicing Physicians in America**, Cleveland, Ohio. (M. P. A. Claudio, APPPA, 132 Emerson Dr., Schaumburg, Ill. 60172)

18–22. American Soc. for **Pharmacology and Experimental Therapeutics**, Montreal, P.Q., Canada. (E. B. Cook, ASPET, 9650 Rockville Pike, Bethesda, Md. 20014)

18–23. American Assoc. of **Clinical Chemists**, Las Vegas, Nev. (J. S. King, Jr., AACC, P.O. Box 15053, Winston-Salem, N.C. 27103)

18–24. Conference on **Advances in Chemistry**, 16th, California Assoc. of Chemistry Teachers, Pacific Grove. (E. N. Garcia, School of Natural Sciences and Mathematics, California State College, Dominquez Hill, 90747)

18–24. International **Epidemiological** Assoc., 7th intern. scientific mtg., Brighton, England. (M. Henderson, Dept. of Preventive Medicine, School of Medicine, Univ. of Maryland, Baltimore 21201)

18–24. International Congr. of the **Transplantation** Soc., 5th, Jerusalem, Israel. (Secretariat, ICTS, P.O. Box 983, Jerusalem)

18–29. Advanced Study Inst. on **Phloem Transport** Conf., North Atlantic Treaty Organization, Natl. Research Council, and Natl. Science Foundation, Banff, Alta., Canada. (S. Aronoff, Dean of Science, Simon Fraser Univ., Burnaby, V5A 1S6, B.C., Canada)

19–21. Midwest **Prairie** Conf., 4th,