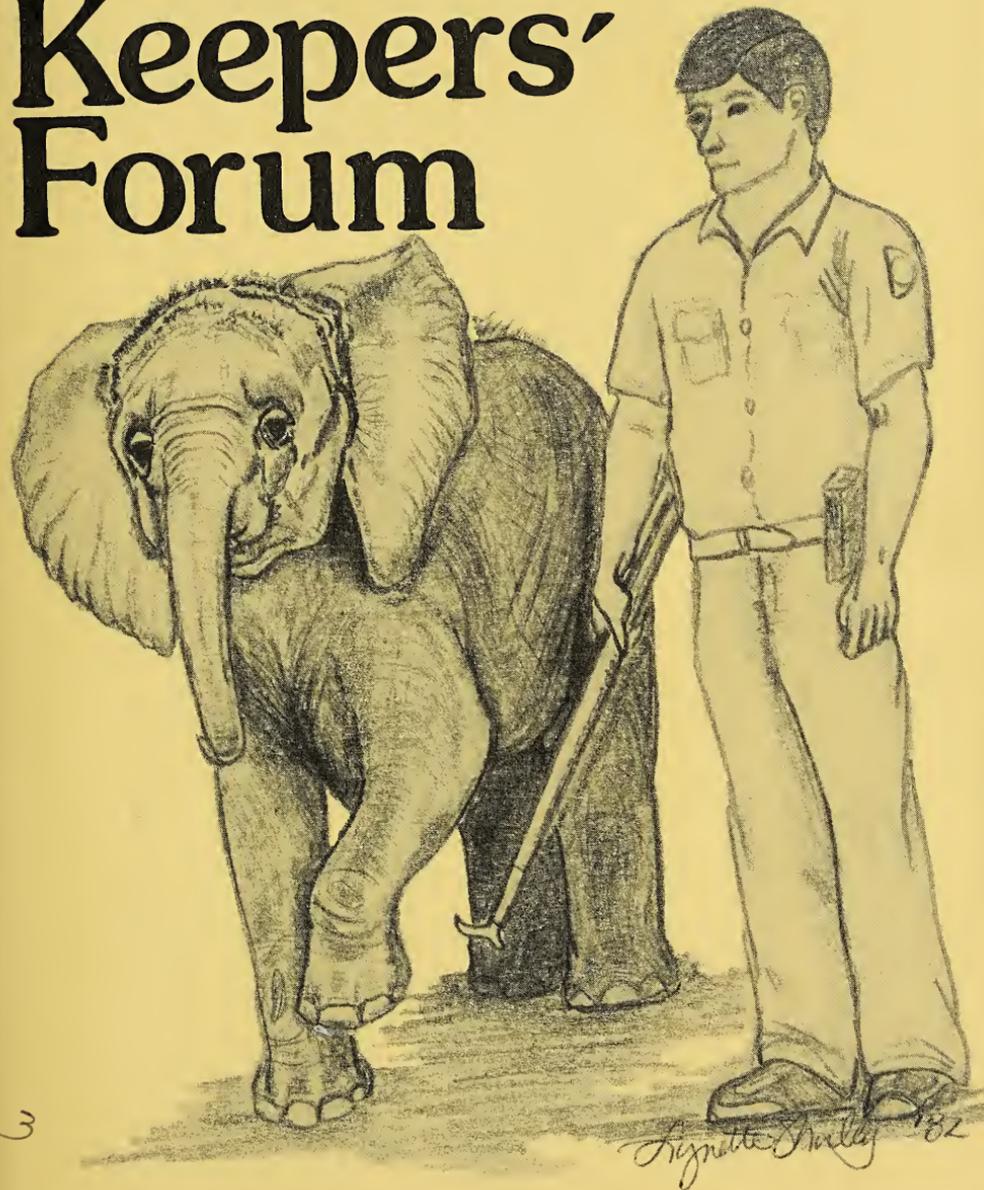


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# Animal Keepers' Forum



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*Dedicated to Professional Animal Care*

JULY 1982

Executive Editor: Mike Coker  
 Managing Editor: Susan Chan  
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 CANADA

This month's Keeper/Artist is Lynette Shirley, a hoofed mammal keeper at the Dallas Zoo. Her cover features a young African female being trained at Dallas. An article on this training program is featured on page 160 of this issue. Thanks, Shirley!

# Scoops and Scuttlebutt

## CALL FOR PAPERS ISSUED FOR UPCOMING ELEPHANT WORKSHOP

Persons interested in presenting papers at the Third Annual Elephant Workshop to be held 9-10 October 1982 at Dickerson Park Zoo, Springfield, MO., are requested to contact the Program Committee. Format for the workshop is to be informal, but topics must relate to the management and breeding of elephants in captivity. Ideas, abstracts, and/or papers may be sent to: Elephant Workshop Committee, Dickerson Park Zoo, 3043 North Fort, Springfield, MO 65803.

## *from the President*

Dear Fellow AAZK Members,

Karen Starr Wakeland is to be thanked for all her efforts in the various tasks she has undertaken for the Association. She is continuing to organize the production of the AAZK film--"Looking to the Future"--our presentation of zoo keeping to the public. Because of her time commitment to this and other affairs, Karen has resigned her position as International Affairs Coordinator.

Keepers who are interested in serving AAZK as the International Affairs Coordinator should contact me as soon as possible. The job involves corresponding with our foreign members and keeping in contact with keeper associations in other countries. Annually, AAZK prepares a state of the association report and it is up to the International Affairs Coordinator to distribute these to our sister associations and request the same in return. There is a mailing budget to cover expenses for official business and the coordinator is expected to remain in close contact with the AAZK president, especially when explaining matters of policy to our foreign members.

A little time involved in foreign correspondence for AAZK will give a keeper a chance to communicate with us all on an international level. Please contact me soon with your interest in serving AAZK in this capacity, or with suggestions for improving our international communication.

Thank you for all you are doing for AAZK and your fellow keepers.

Sincerely,

Pat Sammarco  
AAZK President

# Births & Hatchings

## APRIL BIRTHS AT THE LITTLE ROCK ZOO.....Chris Rasums

Spring is busting out all over the Zoo and more are on the way. April births include: 3.0 Nilgai, 0.0.1 Brown Lemur, 1.0 Blackbuck Antelope (DNS), 0.0.1 Canadian Goose, 2.1 Serval (0.1 DNS), 1.2 Patagonian Cavy. Also taking their first peeks over the top of their mother's pouches in April were 0.0.1 Dama Wallaby and 0.0.1 Giant Red Kangaroo. Dates of births are estimated January 1982 and December 1981 respectively.

## B & H FROM MILWAUKEE COUNTY ZOO.....Nina M. Schaefer

The Milwaukee County Zoo is pleased to announce the following births for the first half of this year January through May: 1.0 Patas Monkey, 0.1 Orangutan, 0.0.1 Cotton-top Marmoset, 1.2 Common Marmoset, 0.0.2 Japanese Macaque, 0.0.1 Siamang, 0.0.1 Wanderoo, 0.1 Lowland Gorilla, 1.1 Ruffed Lemur, 1.1 Blackbuck, 1.0 Eland, 0.1 Impala, 1.0 Dall Sheep, 0.0.1 Patagonian Cavy, .0.2 Snow Leopard, 0.1 Pallas Cat, 1.1 Geoffry Cat and 0.3 Caracal.

## ATLANTA ZOO RECEIVES GAVIALS ON BREEDING LOAN.....Connie Waterstradt

On 22 April 1982, the Atlanta Zoo received 2.0 gavials (*Gavialis gangeticus*) on breeding loan from the Reptile Breeding Foundation in Picton, Ontario. The gavials were flown down by the Royal Canadian Air Force, and accompanied by Thomas Huff, director of the Foundation. We hope to pair these males with the two females already housed at the Atlanta Zoo for the first captive breeding outside of India.

In 1981 the Atlanta Zoo received a female on breeding loan from the Reptile Institute in Silver Springs, FL; the original female has been in our collection since 1966 when it was received as a juvenile.

## CALIFORNIA ALLIGATOR FARM ANNOUNCES B & H.....Ted Daehnke

The California Alligator Farm in Buena Park is pleased to announce that during April and May 1982, the Farm produced a Spider monkey, False Water cobra, Chinese cobra and Cascabel.

## TOPEKA ZOO ANNOUNCES JUNE ADDITIONS.....Mike Coker

The Topeka Zoo staff is pleased to announce the birth of 1.0 Cotton-headed Tamarin and 0.0.7 Trumpeter Swans. Also 1.1 Przewalski horses were born at the Zoo's Conservation and Propagation Center.

## SAN ANTONIO ZOO LISTS MAY B & H.....Cindy Roger

The San Antonio Zoo is pleased to announce the following births and hatchings for the month of May. The Bird Dept. hatched 2 Crested Screamer, 2 Plumed Whistling Duck, 1 White-faced Whistling Duck, 3 Whooper Swan, 1 Moluccan Radjah Shelduck, 2 Patagonian Crested Duck, 33 Mallard, 1 Ringed Teal, 2 Red-crested Pochard, 4 Brazilian Teal, 10 Wood Duck, 1 Impeyan Pheasant, 2 Demoiselle Crane, 5 Red-and-white Crake (2 DNS), 1

## BIRTHS AND HATCHINGS, Continued

Double-striped Thick-knee, 3 Diamond Dove, 1 Nicobar Pigeon, 4 Green-winged Macaw (2 DNS), 3 Sun Conure, 2 Pygmy Kingfisher (1 DNS), 2 Toco Toucan, 3 Giant Pitta (2DNS), 6 Shama Thrush (1 DNS), 3 Green-winged Pytilia and 5 Red-bellied Buffalo Weaver.

The Large Mammal Dept. produced 1.0 Nyala, 1.0 Schmitar-horned Oryx, 0.1 Gemsbok, 0,2 Besia Oryx (1 DNS), 0.1 Cape Hartebeest (DNS), 1.0 Topi, 0.1 Blackbuck, 0.1 Dama Gazelle, 0.1 Dorcas Gazelle (DNS), 0.2 Thomson's Gazelle (DNS), 0.1 Kirk's Dik Dik, 1.0 Bighorn Sheep, 0.1 Aoudad (DNS), 2.0 Himalayan Tarh, 2.4 Turkmenian Markhor (DNS) and 2.0 Mouflon (1 DNS).

The Small Mammal Dept. produced 3 Squirrel Monkey, 1.0 Three-banded Armadillo ((DNS), 4.2 Snow Leopard (3.1 DNS), and 2.0 Reticulated Giraffe. In Reptiles, 4 Peruvian Red-tailed boas and 4 Cantil (1 DNS) hatched. Two Golden Lion Tamarin were born in the Nursery.

The San Antonio Zoo presently has a male White Bengal Tiger, "Chetan", on loan from the Cincinnati Zoo. "Chetan" will be on exhibit for the summer. Our Nursery Staff is successfully hand-raising the male aardvark born last March. The female aardvark born last February is now out on exhibit with her parents and another female.



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## Coming Events

### 6TH REPTILE SYMPOSIUM ON CAPTIVE PROPAGATION AND HUSBANDRY

July 29-31, 1982

Washington, DC

Symposium to be held at the National Zoo. For more information write to Bela Demeter, Host Chairman, Department of Herpetology, National Zoological Park, Washington, D.C. 20008 or call (202) 673-4734.

### 25TH ANNUAL MEETING OF THE SOCIETY FOR THE STUDY OF AMPHIBIANS AND REPTILES

AND

### 30TH ANNUAL MEETING OF THE HERPETOLOGISTS' LEAGUE

August 1-6, 1982

Raleigh, NC

To be held at North Carolina State Museum of Natural History. For information contact Ray. E. Ashton, Jr., Box 27647, Raleigh, NC 27611.

### AAZPA ANNUAL CONFERENCE

September 19-23, 1982

Phoenix (Scottsdale), AZ

### THIRD ANNUAL ELEPHANT WORKSHOP

October 8-9, 1982

Springfield, MO

Hosted by Dickerson Park Zoo. For more information contact: Elephant Workshop Committee, Dickerson Park Zoo, 3043 North Fort, Springfield, MO 65803.

## HAND-REARING GRANT'S GAZELLES

By  
Claudia C. McBride  
Hoofstock Keeper, Tulsa Zoo

In the hoofstock area at Tulsa, we've been hand-raising our first Grant's gazelle calves. These were born one week apart to the two female Grant's gazelle in the mixed species exhibit of our African Savannah. Since our herd is small, we were naturally anxious for these calves to do well. It was therefore a great disappointment when both females rejected their calves.

The oldest calf was born late on a Wednesday afternoon, evidently just before the adult animals were brought into the barn for the night. We had been expecting both females to calve for several weeks, but on this particular evening a new person who was unfamiliar with the animals involved was working the area and did not realize one of them had calved. Consequently, the calf was separated from its mother overnight. Possibly this overnight separation contributed to the mother's rejection of the calf, but this same female had also rejected her first calf.

The next morning it was physically evident that one of the gazelles had calved. Since the calf was not in the exercise yard or stall with the adults we searched the exhibit. When this yielded no results, we released the adults, hoping the mother would go to her calf.

Though we watched throughout the morning we saw no sign of the calf. Although several times the mother was seen to approach the north end of the exhibit and give several low, grunting calls. Shortly after noon we were approached by a member of the public who had spotted the calf in the adjacent exhibit with the Cape Buffalo.

We checked and found it hiding near the barn. At Dr. Russel (the zoo veterinarian's) suggestion, we returned the calf to the gazelle enclosure and kept watch throughout the day. The mother approached it several times during the afternoon but would not allow it to nurse.

It was decided to leave the situation as it was overnight in hopes that at night or in the early morning the mother would be more inclined to accept her calf. As it seemed unlikely it had nursed in the more than 24 hours since birth, Dr. Russel decided to give it a tube-feeding of Esbilac. This, it was hoped would give the calf the best possible chance of survival.

Before daylight of our first gazelle calf's third day, I was situated in a strategic position from which to observe the mixed species area without being seen or scented by the adult gazelles. The adults had been left overnight with access to both the exhibit area and the back exercise yard. Shortly after first light the adults moved out into the exhibit. The calf's mother approached the spot where the calf had been left the night before and it rose from the grass, ran to her and tried to nurse. The female immediately ran from her calf and never again approached during the next two hours.

At 8 a.m. Dr. Russell decided there was no use waiting any longer and we

pulled the calf. Among our white tail deer we have an old tame doe that has raised numerous orphaned fawns along with her own. Less than a week before the birth of this gazelle calf, the white tail's fawns had been sold. As an experiment we decided to put the gazelle calf with the white tail to see if she might show any tendency to accept it. This was done and while the doe showed no hostility, and even licked up some grain sprinkled on the calf's back, the young gazelle maintained a "hiding" posture while the white tail was nearby. Evidently the calf had had too much exposure to members of its own species to accept a surrogate mother with the wrong scent and the wrong approach behaviors.

As it now seemed we had exhausted all other possibilities, Dr. Russell phoned the Oklahoma City Zoo which had hand-raised many Grant's gazelles, to obtain information and advice from them and we began making preparations for bottle-feeding the young gazelle.

From information gleaned from readings and talking with the Oklahoma City Zoo nursery, it was decided we would try our gazelle calf on ordinary whole cow's milk. Oklahoma City had found they had better luck hand-raising these nervous animals if they were kept around people as much as possible. This exposure made them less afraid of people and, consequently, easier to handle with less stress for the animal. Since we had no nursery and the area I work is rather spread out there was no ready location where I could leave the calf where she could be around people a good part of the day. Instead, during her first two days, I occasionally carried her with me in the truck as I made my rounds. Also, we decided I would take her home with me at night for the first few days. This gave her exposure to humans and eliminated the necessity of someone coming out to give her a last late feeding.

From the very beginning Dr. Russell resisted ( and I heartily concurred) the idea of night feedings. Gazelles are 'hidiers' as opposed to 'followers'. Their dams leave them hidden most of the day while they graze, approaching them to nurse only two to three times during a 24-hour period. As the cow's milk we were feeding has a lower fat content than gazelle milk we felt we should give four feedings a day but it seemed unnecessary to get up in the middle of the night for a feeding. (I'm grateful our vet takes this attitude. As far as I'm concerned getting up at 2 a.m. to warm a baby bottle and feed ANY thing is a form of masochism best avoided. I'll do it if I have to, but I won't enjoy it.)

At the first feeding attempt (shortly after she was pulled) the calf took only a few drops of milk. With stimulation she urinated but did not defecate, though she had been observed straining as if attempting defecation.

A second feeding attempt in midafternoon was quite successful. She suckled a few drops of milk from my finger and from there was transferred easily to the bottle nipple. She took several swallows, lost the nipple, then found it herself and drank 2½ oz. all total. From this time on she always took the nipple easily. We used an 8 oz. bottle with a goat nursing nipple which at first seemed as if it might be too large for our calf but she never had any trouble with it, and as we never forced the nipple into her mouth, but always let her begin sucking on it by herself, there was never any problem with choking on too much milk flow.

That first day she received 2½ oz. of milk at 2 p.m., 3½ oz. at 4:30 p.m., 2½ oz. at 8 p.m. and 3 oz. at 10 p.m. Each time she was fed she urinated

## HAND-REARING GRANT'S GAZELLES, continued

when stimulated with a warm, damp towel. Approximately 48 hours after birth her weight was 12 lbs.

She spent her second night curled up behind a large potted plant in my living room. Luckily my roommate is also a zookeeper and was unperturbed to suddenly have the clatter of little hooves about the house.

The afternoon of the second day of feeding we had a few hours worry when the calf refused her afternoon feeding and became very lethargic. At 8:30 that night though, she was eager for her bottle and took 7 oz. of milk without a pause.

September 10 we settled into a schedule of four feedings each day, 8 oz. at each feeding.

She gradually became more active, especially of an evening at home when she would usually wander about a bit after eating. During this first week (in fact all the time she was on a bottle) she urinated copious amounts but never defecated. Naturally this worried us. We assumed the large amount of urine was due to the high water content of cow's milk but it seemed there should be some fecal matter.

Finally on 13 September, when she was one week old and there still had been no defecation, Dr. Russel gave her a mild enema. This produced only a tiny bit of fecal matter. That evening, about eight hours after being given the enema, the calf seemed mildly distressed. She would lick at her sides and bleat softly and was more restless than usual. When these symptoms continued, I put a warm water bottle against her belly. This seemed to relieve her discomfort. In fact, she actually curled up around the bottle and within an hour she seemed back to normal.

In the meantime, further events were transpiring at the zoo. That very afternoon our other gazelle gave birth. I was about to be blessed with a second 'child'.

Having had one small gazelle pattering about the house, the transition to two was fairly simple. All through Thursday we held out hope that the second female might accept her calf, but by late Thursday night she still hadn't accepted. Ever try to drive with two long-legged gazelles sharing the front seat?

The second calf, also a female, settled down even more quickly than the first. We followed the same feeding schedule as we had with the other one and as soon as both were on 8 oz., four times a day, I began to compress the times of the bottles so they could take the first bottle as soon as I got to work in the morning and the last just before I left. While they were cute curled up together behind the plants, I was very anxious that they not grow up as pets. From the time we pulled them, all of us who had a hand in bottle-raising, made it a point not to play with them or pet them. I occasionally used a damp towel to wipe them off and after each feeding they were routinely stimulated until they learned to defecate and urinate on their own. Other than this they were left in a large double stall in our new African Savannah barn.

For the first three weeks of their lives neither gazelle defecated. Needless to say we were worried ( and amazed ) by this but both seemed perky and healthy so we just kept our fingers crossed. After three weeks, each began defecating quite normally. We suspect the low fat content of cow's milk was the major cause of this long delay.

## HAND-REARING GRANT'S GAZELLES, continued

We began offering sweet feed when the eldest was about three weeks and the youngest about two weeks. Neither showed much interest until they were nearly a month old, then they began nibbling a little at the grain and at leafy alfalfa hay. In good weather they were allowed out into the exercise yard where they spent most of the day.

When the eldest calf was three and one half months old we began weaning them. By this time both were eating grain and alfalfa quite well. At this time too we began letting them out at night after the adult gazelles had been brought in for the night to the adjacent exercise yard. Both adult female gazelles evinced little interest but the male seemed quite curious and spent a great deal of time by the fence sniffing noses with his offspring. Just before weaning we allowed the calves and the adults together. Again the male showed the most interest. The adult females would not permit the calves too close but they were not aggressive. We began letting the calves go out with the adults into the large exhibit area during the day. As they seemed to have adjusted quite well to being with the adults, we stopped bottle-feeding them completely.

At this time both calves are nearly a year in age and we believe they have been bred. They are much calmer than the average gazelle and will approach quite close to a keeper--but neither will allow itself to be touched. To me this is success. We have animals that are fairly calm and manageable but they are not pets. Their calmness has been beneficial to the adult gazelles. They are noticeably less upset by a keeper's approach and in fact will allow me to walk by within ten feet of them without moving away. Possibly this decrease in nervousness was partially responsible for our adult females both accepting their calves this year. I have no proof that this contributed to their acceptance of their second calves but, whatever the reasons, I'm glad. The patter of gazelle hooves around the kitchen may be cute--but all those bottles to sterilize! I'll happily let the mothers take over.

*(Editor's note: The preceding article was reprinted from the Tulsa AAZK Newsletter with permission of both the author and the editor.)*



## EIGHT STUDBOOKS APPROVED

Recently, eight more international studbooks were approved by IUCN and IUDZG. The studbooks are for the following species:

- Chinese alligator (Alligator sinensis)- John Behler, Curator/Reptiles, New York Zoological Park
- White-naped crane (Grus vipio)- Chris Sheppard, Asst. Curator/Birds, New York Zoological Society
- Pen-tailed bettong (Bettongia penicillata)- Danny Wharton, Registrar, New York Zoological Park
- Asian lion (Panthera leo persica)- Guy Smith, Director, Knoxville Zoological Garden, Tennessee
- Black lemur (Lemur macaco macaco)- Robert Frueh, Assoc. Curator/Mammals, St. Louis Zoological Park, Missouri
- Slender-horned gazelle (Gazella leptoceros)- Carmine Penney, San Diego Zoo, California
- Red Wolf (Canis rufus)- Gene Leo, Director, Point Defiance Zoo and Aquarium, Tacoma, Washington
- Pacarana (Dinomys branickii)- Fundacao Zoobotanica do Rio Grande do Sul, Porto Alegre, Brazil

----AAZPA Newsletter, June 1982



## Animal Extinctions

What Everyone Should Know



### WILDLIFE AND MAN IN PERSPECTIVE (An Awareness Symposium for the Public)

On Saturday and Sunday, 11 and 12 September, the National Zoological Park will hold a two-day public symposium entitled "Animal Extinctions: What Everyone Should Know". The purpose of the symposium is to provide a link between the scientific community and the general public whereby concerned citizens will be given the opportunity to learn more about current scientific issues which directly affect them. The topics to be covered include a precise definition of extinction, factors that make species vulnerable to extinction, extinction events in the fossil record, and strategies for preserving living species.

The concept for a public symposium developed from NZP's belief that the general public lacks understanding of environmental management issues as they affect wildlife. Scientific information which would help clarify the issues is frequently unavailable or incomprehensible. The Department of the Interior recently issued a news release that provided results from a Yale University study conducted on this subject. The findings indicated that most Americans are uninformed about complex wildlife problems and are not prepared to make informed decisions about controversies that must undoubtedly be faced in the remainder of this century (see March 1982 issue of *Animal Keepers' Forum* for story of this study).

Growing human competition for natural resources and increased land development worldwide will continue to put pressure on natural ecosystems. Habitat alteration and destruction are perhaps the two most important factors contributing to the increasing rate at which animal species are disappearing in the wild. The unchecked disappearance of animal diversity would be a significant loss in terms of educational value, culture and aesthetics. From an economic and medical point of view such a loss might have critical consequences since many of the endangered animals are important subjects for scientific studies, including domestication experiments and biomedical research. These are the kinds of studies which benefit mankind directly in terms of nutrition and health.

The scientists who have been invited to give presentations have national reputations and are known as enthusiastic speakers, so the program should be exceptionally informative. The audience will be able to ask questions of the speakers during the program.

Some of the nationally known speakers will be: Dr. Paul Ehrlich, author of The Population Bomb and co-author of Extinction: The Causes and Consequences of the Disappearance of Species; Dr. Steven Stanley, author of The New Evolutionary Timetable and Macroevolution: Pattern and Process; Dr. Colin Turnbull, author of The Forest People and The Mountain People;

Dr. Norman Myers, author of The Sinking Ark; Dr. Thomas Lovejoy, Program Scientist, World Wildlife Fund; Dr. Steven Humphrey, Florida State Museum; Dr. Robert Jenkins, Vice President for Science Programs, The Nature Conservancy and Dr. Elliot Norse, Director of Science and Policy, Center for Environmental Education. Speakers to be announced for the following topics: "The Realities of Preserving Species in Captivity" and "The Realities of Reintroducing Species into the Wild."

The symposium will be held from 9 a.m. to 5 p.m. on each date in the auditorium of the Zoo's Education Building. For details on the program schedule, speakers and tickets, contact Robert J. Hoage (202) 673-4840.



## ZOO News From Japan

### FIRST BREEDING SUCCESS IN THE THIRD GENERATION OF GORILLA

By  
Yoshi. Yonetani  
ZooDEL/JAPAN

At last we came in touch with good news from the Kyoto Municipal Zoo which is the second oldest zoo in Japan. A baby Lowland Gorilla was born at about 8:40 p.m. on 15 May and was ascertained to be a male two days later.

The baby was the son of "Mac", 11 and a half years old, who was the first of this species to be captive-born in Japan. He was born as the result of artificial insemination on 29 October 1970. The infant's mother, "Hiromi", presumed to be about nine and a half years old, became "Mac's" mate in May of 1976. The newborn's grandmother and grandfather had been at the Zoo since they were about two years old and have since died.

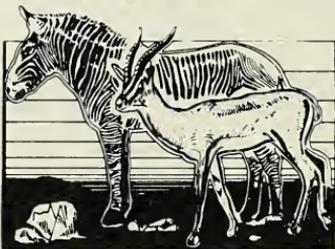
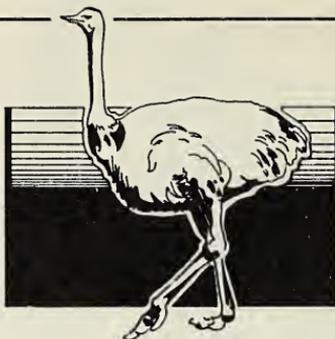
The baby was estimated to weigh 2300g just after delivery and was thought to be about 45cm in height.

Though the mother "Hiromi" learned the art of rearing infants by watching a documentary film about the ecology of Gorillas, this is her first birth and actual experience raising a baby.\* By reason of her situation, it seems difficult for her to nurse the baby by herself. Nevertheless, in the present condition, she is taking care of her Junior (...his name will be collected publically).

In this connection, all of the propagation marks only four examples in the past. It is no more than 2 males (including "Mac") and 1 female to have survived. So, we think much of this 5th breeding in our country. We hope her infant rearing will be going forward smoothly. This report was written on 3 June 1982.

\* The documentary mentioned was filmed at Lincoln Park Zoo in Chicago this year. An 8 mm film of the gorilla birth scene was taken from the VIR tape and shown to "Hiromi" several times a day prior to her giving birth.





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# *An Encouraging Word.....*

## NATIONAL AQUARIUM TO REMAIN OPEN

The National Aquarium, which had been scheduled to close February 28, will continue to operate under a cooperative agreement transferring its operation from the Interior Department's U.S. Fish and Wildlife Service to a private, non-profit organization, the National Aquarium Society.

"Over the years, the National Aquarium has been enjoyed by millions of visitors to the Nation's Capital, and countless area residents have had their first experience with aquatic life here," said G. Ray Arnett, Assistant Secretary for Fish and Wildlife and Parks. "And so we are delighted that the aquarium will remain open to the public under the sponsorship of the National Aquarium Society. This is an excellent example of cooperation between the government and the private sector to continue activities that the government must phase out because of the need to reduce Federal spending."

The aquarium, which is located in the basement of the Commerce Department building in Washington, D.C., will be entirely funded by the National Aquarium Society. The Society plans to raise money through memberships, an "Adopt-a-Fish" program, and donations from individuals and corporations. Guest Services, Inc. (GSI), a private company that provides food, lodging, and recreational services and that operates a cafeteria in the Commerce Department building, has contracted to operate the aquarium for the Society. GSI has also become the first corporate donor with a contribution of \$10,000. An admission fee of \$1 for adults and 50 cents for children will be charged beginning in the near future.

Mr. Malcolm Baldrige, chairman of the National Aquarium Society and wife of the Secretary of Commerce, said that the Society eventually hopes to provide free admission for Washington school children and perhaps for all children on certain days, and that funds will also be used for capital improvements in the aquarium, educational projects, special displays, and establishment of a gift shop.

The future of the aquarium had been in doubt since last year, when its quarter-million-dollar budget was proposed for elimination as part of the Administration's effort to reduce Federal spending. Congress provided no funds for operation of the aquarium in the Fish and Wildlife Service budget for fiscal year 1982.

The aquarium was founded in 1873 at Woods Hoe, MA, and was moved to Washington in 1878. It has been at its present location since 1932. Responsibility for the aquarium was transferred to the Department of the Interior in 1938, but the aquarium remained in its Commerce Department location.

Presently the aquarium exhibits over 100 species of freshwater fish and marine fish, ranging from fish of the Chesapeake Bay region to sharks and colorful South Pacific reef fish. It is visited by about 350,000 people annually.

# ELEPHANT SET



## SUCCESSFUL ELEPHANT TRAINING

### PROGRAM IN DALLAS

By  
*Mary Beth Lasher*  
Keeper, Dallas Zoo

The Dallas Zoo recently sold their two adult Asian elephants and acquired a young pair of female African elephants. While the former Asians had no formal training for the 25 years they spent in the zoo, the zoo administration felt it necessary to employ a professional elephant trainer for the new Africans, since they needed to be handled differently. In March of this year, Richard "Army" Maguire was contracted for one month to break the baby Africans.

The elephants, "Moja" and "Mbili" are both about two years old and were wild caught which was to Maguire's advantage since no bad habits from previous handling needed to be broken. Before the training program began, the keepers were able to chain the elephants at night (sometimes with much difficulty) and were able to teach some commands such as "trunk" and "foot." However, the elephants always worked for food and it was quite obvious that when they weren't in the mood to cooperate, they could not be worked.

Maquire's training of African elephants specifically involved and required positive reinforcement. Very little, if any, physical discipline was necessary. According to Maquire, Africans seem to respond much better to this method of training than do Asians. Positive reinforcement in this program included food rewards and specific praises such as "Good Girl."

The first few days of training were spent mostly breaking the elephants to lay down. This seemed to be the most difficult behavior to break and most of two weeks was spent working the elephants for some portion of each day on this command. "Moja" and "Mbili" were worked in different sessions, approximately one and a half to two hours each. Timing was very important to Maquire's training program. He claims if an elephant is overworked on one specific behavior, the command will not have a chance to "sink in". Therefore several commands were worked on during any particular day.

About the middle of his first week, Maguire was teaching both elephants some simple tricks along with their basic commands. The elephants seemed to be catching on to the idea of the reward system and began responding to commands much more readily. By the second week, the keepers were able to lead both elephants around the zoo grounds; eventually "Mbili" was taught to "Tail" (grab the tail with the trunk) with "Moja" and they were led about this way.

Although "Army" Maguire was contracted only to break the Africans to lay down, lead, come, hold steady and back up during his month's stay at Dallas, he was able to accomplish these commands in less than two weeks. After seeing Maguire's work, Dallas Zoo Director Larry Calvin talked positively about eventually putting a trained elephant show in the zoo as a main attraction. With his remaining time in the zoo, Maguire taught

## Successful Elephant Training Program in Dallas, continued

various circus tricks to both elephants, including sitting on a tub and standing on their hind feet. These particular tricks were difficult since a baby elephant's muscles need to be developed and strengthened for such behaviors.

In all, the elephants together learned approximately 30 tricks and commands in less than one month. After the first two weeks, Maguire was able to teach one behavior per day to each elephant.

The last week of his contracted stay in Dallas, Maguire allowed the keepers solely to work the elephants, mostly under his supervision. Up until this time, the three keepers being trained worked alongside Maguire observing the various techniques he used. At first neither elephant worked very well, since they had become accustomed to Maguire's voice and handling methods. But, after much correction of mistakes, the keepers were able to work them fairly well.

Since Maguire's departure, "Moja" and "Mbili" have become well adjusted to their keepers' handling techniques and are regularly worked twice a day. They have responded extremely well to their training program. Hopefully in the future, Dallas will boast of a trained African elephant show.



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## HUSBANDRY HINTS

### REPTILE EGG INCUBATOR

By  
Ted Daehnke, Reptile Keeper  
California Alligator Farm

For the last few years, we have been using a chicken egg incubator sold by Sears to hatch reptile eggs. We have hatched viper, elapid, python, colubrid and crocodilian eggs in these incubators and are pleased with their performance. These incubators are round and have a thermostat located in the center of the lid and a heating element which circles the perimeter of the lid. They are 21 inches in diameter and 8.5 inches high.

Smaller eggs are placed in porcelain crocks on a substrate of moist peat-moss and covered by moist paper towels. The crock is then placed in a plastic bag to retain moisture. Python and crocodilian eggs are placed directly in the incubator on a substrate of moist peatmoss, covered by moist paper towels and then covered with plastic. The incubators are kept in an air conditioned room to avoid the risk that room temperature might exceed the temperature at which the eggs are being incubated.

Any reptile keeper looking for a relatively inexpensive quality incubator should consider this model. The incubator is listed as catalog number AF88043L at a price of \$58.00 in the 1980 Farm and Ranch Catalog.



# Book Review



Animal Behavior (Second Edition Revised)

By John Paul Scott  
Published by The University of Chicago Press,  
5801 S. Ellis Ave., Chicago, IL 60637; 1972;  
349 pp (incl. index&bibliog.), \$6.95 paperback

*Review by Frank Chiles  
Park Guide, National  
Zoological Park*

This book makes the vast and complicated subject of animal behavior interesting and easy to understand. This is due to the careful organization and clear (and often amusing) writing style of the author, John Paul Scott. Scott is Regent's Professor of Psychology and director of the Center for Research on Social Behavior at Bowling Green University.

As stated in the preface, Animal Behavior, "is designed for the general reader or the student who wishes to learn something for himself. A minimum of scientific phraseology is used." (However, some basic knowledge is helpful, especially in the chapters on anatomy and physiology.) A brief history of the study of animal behavior is outlined in the preface.

The author clearly shows how inborn capacities and limitations, anatomy, physiology, heredity, environment, experience and intelligence all affect animal behavior. General principles are illustrated with examples from observations of life in the wild and/or laboratory (the latter raising several uncomfortable feelings and questions in my mind concerning the humaneness of some behavioral experiments.) The brief summaries and conclusions ending each chapter are especially helpful in recapping the essential points discussed. Also, the organization of the bibliography by chapter is useful to those who wish to find more information on a specific area

Chapter TWO is like a mini-manual on the study of animal behavior with its concise information on the elements of behavior and the methods used in its study.

Of particular interest is Chapter Ten on "Behavior and the Environment". The amazing experiments with and observations on migrating birds and fish, "biological clocks", and hibernating woodchucks, etc. make for fascinating reading. This is especially exciting when one realizes the amount of research still left to be done.

At the risk of being "called out" for anthropomorphizing, I must confess that after reading Animal Behavior, I am still left utterly convinced that my dog wagging his tail and "greeting" me shows more warmth of feeling than mere pack instinct; or that my cat rubbing her fur against my legs and purring can be a genuine expression of affection. My understanding of what causes and/or motivates animal behavior is greatly increased from having read this book, but I am left feeling glad that some things don't seem to be scientifically explainable.



## MIAMI METROZOO KEEPER RAFFLE: AN UPDATE

By  
Jean Hromadka  
Keeper, Metrozoo

On 27 March 1982, our successful fundraiser - "Spend The Day With A Zoo-keeper" - came to an end. The Chapter profitted over \$800.00 for less than a month's worth of ticket selling. Out of the 900 tickets printed, 860 were sold. The only expense was \$50.00 which went to the printer to have the tickets made up.

The first raffle winner did not appear the day scheduled for her tour for reasons as yet unknown. The second winner, Marilyn Gatof, who recently completed a docent course, promptly arrived at 9:00 a.m. After filling out a release form, she was given a complimentary Metrozoo tee shirt and an information folder dealing with the zoo's history. Of course the whole schedule planned for the day was changed due to the unexpected participation of the media. We had the *Miami Herald* and the *West Palm Beach P.M. Magazine* covering the events of the day.

The first stop was the elephant area where our guest was allowed to feed and bathe our 18-month-old African elephant "Machito". She was a real natural with him and I believe the photographers had as much fun taking pictures as Marilyn had getting soaked. The senior elephant keeper explained briefly about elephant management, behavior and training. He even demonstrated some training techniques with our seven-year-old African female.

The Indian rhino was our next stop. There Marilyn got to stand face to face with our nine-year-old female "Shanty". While she hand-fed some hay to "Shanty", the rhino keeper explained to Marilyn his routine and answered questions that she had concerning this particular animal.

The Contact Village was our next stop. There our winner was allowed to bottle-feed a month-old Blackbuck. A usually difficult task, Marilyn handled it like a pro. She also assisted in the educational bird show and helped groom some of the stock.

"Ramar", our only male gorilla was the next animal we visited. Marilyn threw some fruit to him to coax him away from the viewing window. The primate keeper talked with her as they watched "Ramar" inspect his exhibit for more treats. Marilyn got an even closer look at the gorilla through the viewing window. Again some primate behavior was discussed as the press took pictures.

The Bird of Prey show followed. There in the amphitheater, Marilyn held the dollar bill up for the raven to fly out into the audience and take it from the volunteer. Afterwards, she went backstage to talk with our trainers and tour the facility.

The dietary kitchen was the next area to investigate. The kitchen keepers explained the different diets and which foods went to certain animals. They stressed the importance of their job leaving Marilyn very much impressed. She commented that she did not realize that so much thought went into the feeding of exotic animals.

## KEEPER RAFFLE UPDATE, Continued

The last stop was the tiger exhibit. The tiger temple is impressive all by itself, but the keeper explained how the animals were shifted to different night houses. Also the built-in "squeeze cage" was explained as well as the general maintenance required for the area.

Even though the day came to an end by 4 p.m., Marilyn felt she had been introduced to a day in the zoo thoroughly. She said she did not realize what a task it was to operate such a complex operation. We feel we gave her a taste of zoo keeping, but a day just isn't enough time to go into all the many aspects of this profession. We kept in mind that we had to make it enjoyable and not just hand her a rake and shovel--but we did stress that that is 90% of what a zoo keeper does. She obviously saw the rewards. Of course, with the reporters following us all day, we had to cater to them as well, stopping for them to film. But even though it was a drain, we felt it important for the general public to understand the purpose of zoos and the importance of our work. All in all it was a fun day with everyone involved walking away with the feeling of accomplishment.



## Information Please

Information is needed on the Four-toed hedgehog (*Erinaceus albiventris*), especially housing and diet for expectant females. Anyone having such information is asked to contact Karen Kaplan, Children's Zoo Keeper at the Houston Zoo, 1513 Outerbelt Drive, Houston, TX 77030 or call (713) 520-3252.

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Information is requested on the Clouded boa (*Boa constrictor nebulosa*) concerning identification, breeding etc. Please send information to Bill Texel, Black Hills Reptile Gardens, Box 620, Rapid City, SD 57709.

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A request has been made to have the cat inventory of your zoo sent to the individual named below. If you are certain of the origin, please include the precise subspecies. Send inventories to: Ga'Bor Besenyo, 5460 Sierra Vista, Los Angeles, CA 90038.

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Loons are often received in either oiled or otherwise injured condition at our bird rehabilitation center, and we have had extreme difficulty in maintaining them during treatment. Any information that may be shared on care, maintenance and medical problems regarding loons would be greatly appreciated. Please contact Andrea Ouse, Wild Birds, 325 South First St., Surf City, NJ 08008, (609) 494-2106.

# The Endangered Species Act .....AN UPDATE

## HOUSE AND SENATE COMMITTEES PASS ENDANGERED SPECIES ACT REAUTHORIZATION

On 5 May, the House Merchant Marine and Fisheries Committee approved H.R. 6133 by a unanimous voice vote. This bill extends the reauthorization of the Endangered Species Act for three years.

Provisions of H.R. 6133 include the following:

1. The bill speeds up the listing process by forcing the Secretary to consider listing or delisting a species upon receipt of a petition containing substantial evidence. Unless there is a conflict of scientific information, the decision must be made within one year. Listing is to be based solely on a biological basis.
2. The Secretary, to the maximum extent prudent and determinable, is to designate critical habitat at the time a listing is made. However, if the Secretary cannot designate habitat at that time, he is given a one year deadline from the date of listing. Designation of critical habitat is subject to economic analysis.
3. The bill allows for the establishment of experimental populations.

On 11 May, the Senate Environment and Public Works Committee approved S. 2309 by a unanimous roll call vote. Like the House version, it reauthorizes the Act for three years. A number of co-sponsors were added to the bill at that time. The sponsors are now: Baker (R-TN), Baucus (D-MT), Chaffee (R-RI), Gorton (R-WA), Mitchell (D-ME) Murkowski (R-AK), Randolph (D-VW), and Stafford (R-VT).

Some important provisions of the bill are:

1. The Senate bill requires the Secretary to publish a proposed regulation within 12 months after receipt of a petition presenting substantial scientific information. If the Secretary decides, based on the best scientific and commercial data available, that no listing is warranted, he must publish that finding within 12 months. One year after the general notice of regulations, the final determination must be published.
2. Provisions for the designation of critical habitat are identical to those of the House bill.
3. The bill provides for experimental populations.

Both the Senate and House bills will be taken to their respective Floors for action soon. Special interest groups are urging Congress to adopt amendments which would weaken the Act. Write your local Congressman: Ask his support of H.R. 6133. Request your Senators to support S. 2309. Urge them to vote in favor of the reauthorization of the Endangered Species Act for three years.

To write, use the following addresses:

The Honorable \_\_\_\_\_  
U.S. House of Representatives  
Washington, D.C. 20515

The Honorable \_\_\_\_\_  
U.S. Senate  
Washington, D.C. 20510

---AAZPA Newsletter, June 1982

# Legislative News

Compiled by Kevin Conway

## FINAL RECOVERY PLANS APPROVED FOR FIVE SPECIES

Final recovery plans for four species have been approved by the U.S. Fish and Wildlife Service Director: Grizzly Bear Recovery Plan--1/29/82; Maryland Darter Recovery Plan--2/2/82; Southern Sea Otter--2/3/82; and Socorro Isopod--2/16/82. A comprehensive work plan for the Florida manatee was signed on 2/2/82.

### Grizzly Bear

Historically, the range of the grizzly bear (*Ursus arctos horribilis*), extended from Ontario, Canada, westward to the California coast and from Alaska south to Texas and Mexico. Between 1800 and 1975, grizzly populations in the lower 48 contiguous States declined from estimates of over 1000,000 to less than 1,000 bears. The leading causes for the species decline were livestock depredation control, habitat deterioration, protection of human life, commercial trapping and sport hunting. Logging, mining, ranching, farming and recreational development continued to add to man-caused mortality and adverse alteration of the grizzly's habitat.

Grizzlies are believed to have disappeared from Texas by 1890, California by 1922, Utah by 1923, Oregon by 1931, New Mexico by 1933 and Arizona by 1935. Remnant populations remain in mountainous park, forest and wilderness areas of Idaho, Montana, Washington and Wyoming. A grizzly bear was killed in early 1979 near the Continental Divide in San Juan National Forest, CO. This report casts doubt on whether the grizzly is still extant in Colorado.

The recovery plan identifies six ecosystems where grizzlies have been present during the past decade. These areas presently have adequate space and suitable habitat for the species' continued survival and are the primary focus of the recovery plan. The six areas lie in and around Yellowstone National Park, the Glacier National Park and Bob Marshall Wilderness Area, Cabinet-Mountains, Selkirk Mountains, the Selway-Bitterroot Wilderness Area, and the North Cascades National Park.

Three of the six areas, where grizzly research is already underway and from which extensive data bases are available, were identified as high priority for implementing recovery tasks. These areas are designated Yellowstone Grizzly Bear Ecosystem (YGBE), the Northern Continental Divide Grizzly Bear Ecosystem (NCDGBE--Glacier National Park/Bob Marshall Wilderness Area) and the Cabinet-Yaak Grizzly Bear Ecosystem (CYGBE). Implementation of recovery actions in the remaining ecosystems will be undertaken as additional funds become available.

Highest priority tasks identified in the plan include: (1) decreasing losses to the populations from illegal take and other man-caused mortality. (It is especially important to reduce losses of female bears.); (2) monitoring the population status and trends; (3) developing and/or applying guidelines for multiple use activities on Federal lands to avoid conflicts with grizzlies; and (4) completing and resolving management stratification of Federal lands to reflect the different intensities and importance of grizzly bear use and provide optimum management direction.

## RECOVERY PLANS APPROVED, Continued

Implementation of the recovery plan will be initiated by the Service's Denver Regional Director and carried out through the Denver Regional and Billings Area Office Endangered Species Staffs. Further information can be obtained by contacting the Regional Director, U.S. Fish and Wildlife Service, P.O. Box 25486, Denver Federal Center, Denver, CO 80225 (303) 234-2209.

### Southern Sea Otter

The remnant southern sea otter (*Enhydra lutris nereis*) population in California currently inhabits approximately 300 kilometers of nearshore coastal waters from Oceano in San Luis Obispo County to Santa Cruz in Santa Cruz County. Although this population has been slowly expanding in range, the number of otters does not appear to have increased at expected rates in recent years.

The California population has been under protective State legislation since 1913. In 1971, protective responsibility for the species was assigned to the Federal government under the Marine Mammal Protection Act (MMPA). Further protection was given the sea otter in 1977 when it was listed as Threatened under the Endangered Species Act of 1973 (ESA). Under both the MMPA and ESA, Federal and State agencies are responsible for protecting the sea otter and its habitat.

The Service has the lead responsibility for developing and implementing the Southern Sea Otter Recovery Plan. The recently completed recovery plan was prepared by the Service in cooperation with the Southern Sea Otter Recovery Team.

The main objective of the recovery plan is to restore the southern sea otter to a non-threatened status and to maintain its population at its optimum sustainable level. Delisting of the species can be considered when the population is stable or increasing at sustainable rates in a large enough area of their original habitat that only a small portion of the population would be decimated by any single, natural or man-caused catastrophe. To reach this point (1) at least one additional sea otter population must be established outside the current population range; (2) the existing population and its habitat must be protected; and (3) the threat from oil spills or other environmental changes must be minimized. The recovery plan outlines strategies to achieve these goals.

Secondary concerns include:

- \*vandalism, poaching, and other forms of illegal take;
- \*contamination of the sea otter and/or its habitat from sources other than oil;
- \*destruction and degradation of sea otter habitat as a result of coastal zone development or other human activities;
- \*the likelihood of increased conflict with commercial and recreational fisheries; and
- \*lack of precise data concerning numerical and functional relationships between sea otters, shellfish, finfish, kelp and other components of nearshore marine communities.

Sea otter translocation should provide the necessary foundation for ultimately achieving the recovery plan objective. Implementation of the recovery tasks will be initiated by the Service's Portland Regional Director and carried out through the Portland Regional and Sacramento Area Office Endangered Species Staffs. Further information can be obtained by con-

## RECOVERY PLANS APPROVED, Continued

tacting the Regional Director, U.S. Fish and Wildlife Service, Suite 1692, Lloyd 500 Building, 500 N.E. Multnomah St., Portland, OR 97323 (503) 231-6118.

### Florida Manatee

A Comprehensive Work Plan for the West Indian Manatee (*Trichechus manatus*) has been prepared to assist with the planning and budgeting of future manatee recovery actions. The plan is a revision of the Outline and Implementation Schedule (Parts II and III) of the Florida Manatee Recovery Plan which was completed in 1980 and will be appended to the recovery plan. It identifies 33 public and private organizations which are now working on manatee conservation efforts in Florida.

Implementation of the work plan will be initiated by the Service's Atlanta Regional Director and carried out through the Atlanta Regional and Jacksonville Area Office Endangered Species Staffs. Further information can be obtained by contacting the Regional Director, U.S. Fish and Wildlife Service, Richard B. Russell Building, 75 Spring Street, S.W., Atlanta, GA 30303 (404) 221-3583.

The Recovery Plans for the Socorro Isopod and Maryland Darter are being carried out by the Albuquerque, NM Endangered Species Staff and the Newton Corner, MA Endangered Species Staff respectively.

---Endangered Species Technical Bulletin

## FISH AND WILDLIFE SERVICE CONDUCTS REVIEW ON DOMESTIC WILDLIFE SPECIES LISTED IN CITES

On 17 February, the Fish and Wildlife Service published a notice in the *Federal Register* announcing the preliminary results of their review of domestic wildlife species listed in the appendices to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) treaty. It was determined during the 1981 CITES meeting in New Delhi that species listed on the treaty should be periodically reviewed.

CITES regulates international trade in certain wildlife and plant species. Appendix I includes species threatened with extinction that are or may be affected by Trade. Appendix II includes species that are not necessarily threatened with extinction but may become so unless trade is strictly controlled. These listings are required because of difficulty in distinguishing specimens of currently or potentially threatened species from other species. Appendix II includes species that any Party nation identifies as regulated within its jurisdiction for prevention or restricting exploitation and for which it needs cooperation from other Party nations.

After conducting the initial review, FWS is tentatively considering the following proposals:

1) Removal of bighorn sheep (*Ovis canadensis*) from Appendix II in Canada and the U.S. The bighorn sheep is managed and protected game in Canada, Mexico and the U.S.

FWS REVIEWS DOMESTIC CITES LISTINGS, *Continued*

- 2) Removal of the gray wolf (*Canis lupus*) in Canada and Alaska from Appendix II. The gray wolf is listed as endangered under the Endangered Species Act in most of the contiguous 48 states and as threatened in Minnesota. In Alaska the take is strictly regulated.
- 3) Removal of the grizzly bear (*Ursus arctos*) from Appendix II in Alaska and Canada. The grizzly bear is listed as endangered in the contiguous states. Populations remain relatively secure in large areas of undisturbed natural habitat in Alaska and Canada.
- 4) Removal of the lynx (*Lynx canadensis*) from Appendix II. Each state where lynx is harvested borders Canada, which is also expected to propose the species' removal from Appendix II.
- 5) Listing the pronghorn antelope (*Antilocapra americana*) by populations instead of by subspecies, placing the Mexican population in Appendix I. Two subspecies pronghorns are listed as endangered under the Endangered Species Act and also included in Appendix I of CITES. One other subspecies is listed in Appendix II of CITES. The four recognized subspecies of pronghorns differ only slightly in color and form.
- 6) Retaining the river otter (*Lutra canadensis*) in Appendix II because of similarity in appearance to other species.
- 7) Listing the entire species of swift fox (*Vulpes velox*) in Appendix II, since the subspecies are indistinguishable. One subspecies, the northern swift fox (*Vulpes velox hebes*), is listed as endangered under the Endangered Species Act and listed in Appendix I of CITES.
- 8) Removal of the tule-fronted goose (*Anser albifrons gambelli*) from Appendix II of CITES. It is already protected from trade under the migratory bird treaties between the nations where it occurs.
- 9) Transferral of Mona Island boa (*Epicrates monensis monensis*) from Appendix II to Appendix I. Because of its rarity and because it is endemic only to Mona Island, Puerto Rico, FWS believes it could easily be over-exploited and therefore deserves protection under Appendix I.
- 10) Removal of blue pike (*Stizostedion vitreum glaucum*) from Appendix I. Habitat degradation and overfishing has probably made this fish extinct. If any living specimens are discovered, they would be amply protected by state and national laws. It is listed as endangered under the Endangered Species Act.
- 11) Removal of longjaw cisco (*Coregonus alpenae*) from Appendix I. Overfishing and sea lamprey predation have been cited as reasons for its decline. The last reported sighting was in 1967.

FWS requests further information and comments from the public, which will be considered when determining proposals the U.S. will submit for consideration by CITES party nations.

---AAZPA Newsletter  
April 1982



# Conference.....83

## CALL FOR PAPERS

There is still space in the 1982 AAZK Conference agenda for the presentation of papers. The conference theme is "A Zoo For All Seasons", and suggested topics may be found in the April 1982 issue of *Animal Keepers' Forum*. Papers will be accepted on other topics if time and space permit. For further details, consult your April AKF.

Send papers to : Fran Turner, AAZK Conference Coordinator, Metro Toronto Zoo,, P.O. Box 280, West Hill, Ontario M1E 4R5, Canada.

## 1982 AAZK CONFERENCE WORKSHOPS

The following is a preliminary list of workshops which we hope to present as part of the conference. We shall be happy to look at any suggestions for additional workshops from those interested in attending. Workshops tentatively scheduled are: Zoo Horticulture, Zoo Animal Nutrition, Reptiles and Amphibians at M.T.Z., Herbivores at M.T.Z., Carnivores at M.T.Z., Elephants at M.T.Z., Birds at M.T.Z., Fish at M.T.Z., Camel Training at M.T.Z., Tour of the Animal Health Unit, Women in Zoos, Keeper Education, Keeper Safety and Zoo Research.

Pat Vandebussche, a Keeper at MTZ, is organizing the Workshop on Keeper Safety. Anyone interested in participating in this Workshop is asked to please contact Pat. Input is requested on safety in your zoo, problems, precautions, equipment, clothing, injuries etc. Persons interested should contact: Pat Vandebussche c/o Metro Toronto Zoo, P.O. Box 280, West Hill, Ontario, Canada M1E 4R5 or at home, 24 Strader Ave., Bronto, Ontario, M6C 1P9 Canada.

## CONFERENCE NOTES AND REMINDERS

- Mail takes extra time between the U.S. and Canada, so register early.
- The Canadian dollar fluctuates at about 20% below the value of the American dollar. Actual room prices in October may be slightly different than those presently quoted.
- All AAZK members planning to attend the Toronto Conference are asked to remember to bring an item for the auction. The auction is not only a lot of fun for everyone, but helps to offset the Conference expenses. So bring an animal-related item from your zoo and be represented at the Auction.
- There are a limited number of accommodations available with keepers on a first-come, first served basis. Please write as soon as possible if you are interested in staying with a keeper--include number in party, interests, whether vegetarian, non-smoker etc.

## TENTATIVE AGENDA FOR 8TH NATIONAL AAZK CONFERENCE

### Sunday, October 3

Board Meeting  
Registration  
Icebreaker

### Monday, October 4

Welcome and Introductions  
Tour of Metro Toronto Zoo  
Zoo Lunch  
Workshops  
Free Evening

### Tuesday, October 5

Papers           Volleyball  
Lunch            Dinner on the Town  
Papers

### Wednesday, October 6

Papers  
Free afternoon--tour of Petersborough Zoo, tours and workshops at the Metro Toronto Zoo  
Auction

### Thursday, October 7

Papers  
Lunch  
General Membership Meeting  
Banquet at Casa Loma

HOSTED BY Metro Toronto Zoo AAZK Chapter  
at: The Chelsea Inn, 33 Gerrard St. W.,  
Toronto, Ontario Canada.



We are indebted to the AAZPA Newsletter for allowing us to reprint portions of this section from their "Positions Available" listing. This is a monthly service to us, for you.

BIRD KEEPER...responsible for care and maintenance of expanding bird collection. Requires minimum of two year's paid professional experience in aviculture. Formal education helpful but not mandatory. Salary \$11,900/yr., plus benefits. Send applications to Dale Stastny, Deputy Director, Audubon Park & Zoological Garden, PO Box 4327, New Orleans, LA 70178.

BIRD DEPT. SUPERVISOR...responsible to curator for collection, husbandry and personnel supervision. Must have strong background in zoological aviculture, plus supervisory experience. Degree in biological sciences helpful or many years practical experience. Salary \$13,900-\$14,740. Reply by 1 August 1982 to Bruce Miller, Oklahoma City Zoo, 2101 NE 50th, Oklahoma City, OK 73111. (405) 424-3344

ZOO CURATOR...under general supervision, supervises and coordinates activities of workers engaged in care and exhibition of birds and animals. Qualifications include a Bachelor's degree in Zoology or related field and two year's experience or an equivalent combination. Salary \$17,780/year. Send resume by 13 August 1982 to Tribal Parks Manager, Recreational Resources Dept., PO Box 308, Window Rock, AZ 86515.

EDUCATION COORDINATOR...responsible for education and public information programs. Requirements include Bachelor's degree from accredited college or university in Biological Sciences or related field. Must possess effective writing and speaking abilities; background experience in natural history, teaching, zoo biology and marketing preferred. Salary \$15,500-\$16,900 and benefits. Submit resume by 31 July 1982 to: Charles G. Wilson, Director, Memphis Zoo & Aquarium, 2000 Galloway Ave., Memphis, TN 38112.

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The following "Positions Available" were sent directly to the editorial offices of Animal Keepers' Forum for inclusion in this section.

ZOO FOREMAN...performs supervisory, minor administrative and technical work in care and exhibition of 1,500 specimen, 350 species animal collection. Minimal requirements are four years of animal care experience involving a wide variety of mammals, birds and reptiles including one year of supervisory experience. This is a Career Service Authority position of the City & County of Denver. Starting salary \$1,900.00/mo., plus complete fringe benefit package. Interested candidates are requested to send complete resume to: Clayton F. Freiheit, Director, Denver Zoological Gardens, Denver, CO, 80205 by 1 August 1982.

ELEPHANT HANDLER...seeking experienced elephant handler to assist trainer. Includes participation in African elephant husbandry program, and other exotic hoofstock management. Salary range \$924-\$1,224 per month with excellent fringe benefits, commensurate with experience. Send resume directly to: Mike Blakley, Curator of Mammals, Kansas City Zoo, Swope Park, Kansas City, MO 64132.

# AAZK MEMBERSHIP APPLICATION

Name \_\_\_\_\_ Check here if renewal [ ]

Address \_\_\_\_\_

\_\_\_\_\_ \$20.00 Professional  
Full-time Keepers and  
International Members

\_\_\_\_\_ \$10.00 Associate  
Individuals not connected  
with an animal care facility

\_\_\_\_\_ \$15.00 Affiliate  
Other staff and volunteers

\_\_\_\_\_ \$50.00 Contributing  
Organizations and individuals

U.S. CURRENCY ONLY PLEASE

## Directory Information

Zoo \_\_\_\_\_ Work Area \_\_\_\_\_ Special Interests \_\_\_\_\_

Mail this application and check or money order, payable to American Association of Zoo Keepers, to: AAZK National Headquarters, Topeka Zoo, 635 Gage Blvd., Topeka, KS 66606.

Membership includes a subscription to the *Animal Keepers' Forum*. The membership card is good for free admission to many zoos and aquariums in the U.S. and Canada

## INFORMATION FOR CONTRIBUTORS



*Animal Keepers' Forum* publishes original papers and news items of interest to the Animal Keeping profession. Non-members are welcome to submit articles.

Articles should be typed or hand-printed. All illustrations, graphs and tables should be clearly marked, in final form, and should fit in a page size of no more than 6" x 10" (15 cm x 25½ cm.). Literature used should be cited in the text and in final bibliography. Avoid footnotes. Include scientific names.

Articles sent to *Animal Keepers' Forum* will be reviewed for publication. No commitment is made to the author, but an effort will be made to publish articles as soon as possible. Those longer than three pages may be separated into monthly installments at the discretion of the editorial staff. The editors reserve the right to edit material without consultation unless approval is requested in writing by the author. Materials submitted will not be returned unless accompanied by a stamped, self-addressed envelope.

Telephoned contributions on late-breaking news or last minute insertions are accepted. However, phone-in contributions of long articles will not be accepted. The phone number is (913) 272-5821.

DEADLINE FOR EACH EDITION IS THE 15TH OF THE PRECEDING MONTH

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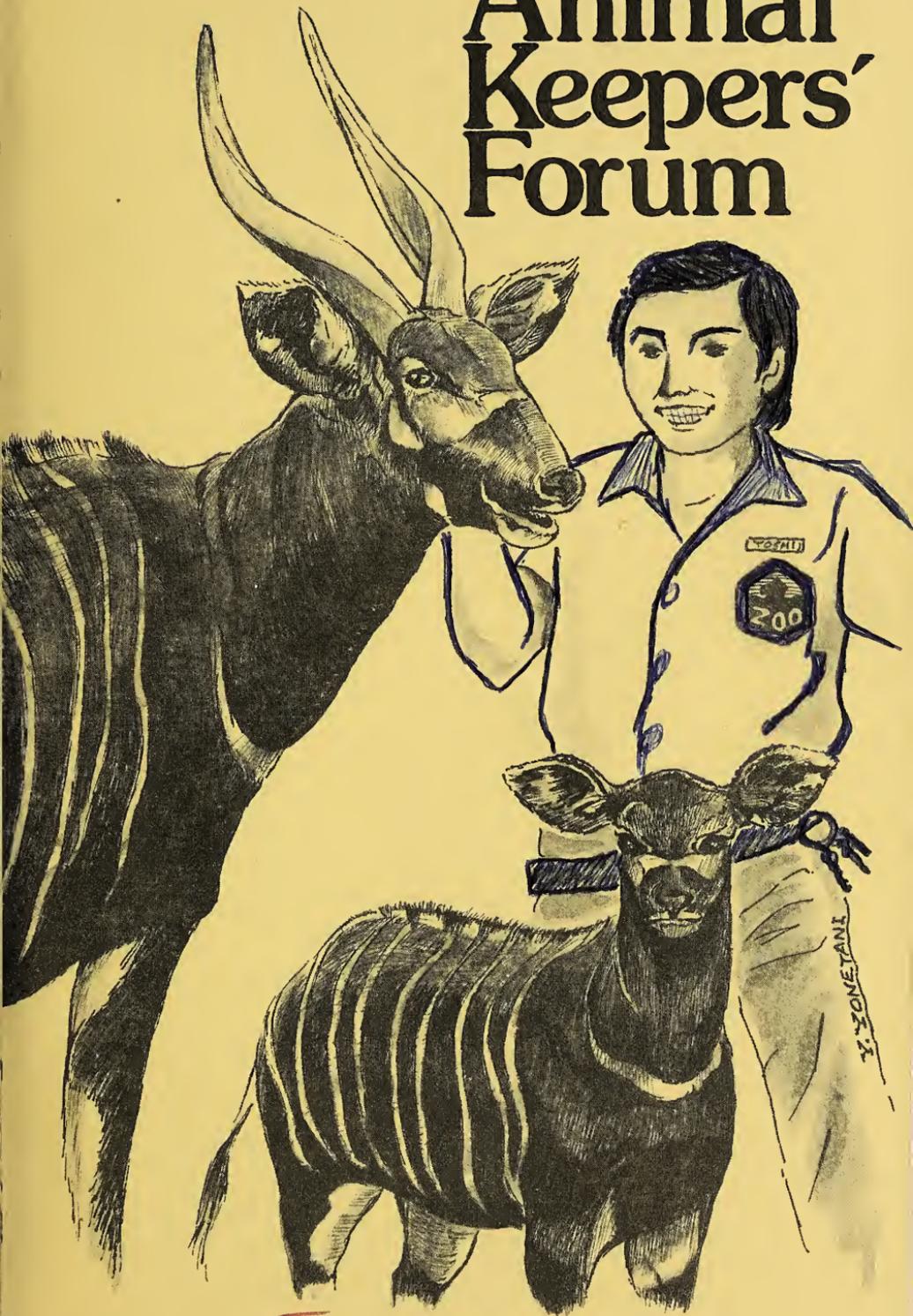
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# Animal Keepers' Forum



*Dedicated to Professional Animal Care*

AUGUST 1982

Executive Editor: Mike Coker  
 Managing Editor: Susan Chan  
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This month's cover illustration of a female Bongo and her calf is by Yoshi. Yonetani. A truly gifted artist, Yoshi. works at ZooDEL (Zoo Design & Education Lab) in Kobe, Japan. He is a regular contributor to AKF with his articles on "Zoo News From Japan". Thanks, Yoshi.!

# Scoops and Scuttlebutt

## ATLANTA KEEPER VISITS SEA WORLD OF ORLANDO

Patrick Mauly, Bear and Sea Lion Keeper at the Atlanta Zoo, recently visited Sea World of Orlando. The trip, including airfare, hotel and meals, was paid for by the Zoological Society and the City of Atlanta, the first time this type of trip for an Atlanta keeper has ever been funded.

While at Sea World, Pat met and talked with keepers and trainers, observed their daily routines and received advice and pointers about training Sea Lions. Pat drove back to Atlanta with Pat Sassic (Supervisor of Animal Care at Sea World) with two new female Sea Lions that will be paired up with Atlanta's male "Big Mac". Special thanks are extended to all the staff at Sea World from Pat for their help and hospitality while he was there.

## VOLUNTEERS NEEDED FOR IDC CHAIRMANSHIP

President Pat Sammarco is requesting those interested in the chairmanship of the Infant Development Committee to please let her know as soon as possible. Marcia Clevenger, Oklahoma City Zoo, recently resigned from this position and a new chairman is needed before the National Conference in October. The chairman is responsible for gathering and coordinating the information for the Infant Development Notebook and will work with others interested in the project on a continual updating of the project. Stationary and postage are provided by National. If interested, please contact Pat at Lincoln Park Zoo.

## NEW AWARDS COMMITTEE MEMBER NAMED

Congratulations to Ann Petric of the Brookfield Zoo on her appointment to the AAZK Awards Committee. This Committee is in charge of the selection of winners for Excellence in Zookeeping and Excellence in Zoo Keeper Education Awards presented annually at the National Conference. Mike Crocker, Dickerson Park Zoo, is Awards Committee Chairman.

## ZOO DENTAL CONSULTANT AVAILABLE TO ANSWER QUESTIONS

Edward V. Shagam, D.D.S.,P.A., zoological dental consultant from Mount Holly, NJ, has graciously consented to offer suggestions and advice to keepers on exotic animal dental problems via AKF. If you have a question or problem concerning the animals in your care, please send all pertinent information (including scientific name of species) to Dr. Shagam, 127 High Street, Mount Holly, NJ 08060. Your question and his response will be forwarded on to AKF for publication. This will be a wonderful opportunity to share Dr. Shagam's expertise with all our members via the Forum.

## *from the President*

Dear Fellow AAZK Members,

With barely a quorum responding, the proposal to incorporate the Association has been approved, 61/4.

The incorporation issue is important to the Association and each member and I am disappointed that the majority of members failed to respond to this question. AAZK is an association of zoo keepers and it is the responsibility of each Professional Member to decide the direction that the Association should take in administrative and professional matters.

With the incorporation will come no changes that will be apparent to the membership, but in terms of legal status, the Association will be better off and the question of tax exempt status for chapters will be resolved.

Thanks to all of you who made the decision to improve the status of AAZK.

A while back, Bernie Feldman, Keeper at Miller Park Zoo and then AAZK Board member, suggested that we consider making a collection of information on zoo animal diets. At the time, the Infant Development Notebook was in its early stages, and the diet collection was tabled. It is now time to reconsider the production of this notebook.

Bernie is unable to chair this project because of other time commitments, so I will appreciate hearing from all of you who are interested in the chairmanship of this project, in working on the committee or who have suggestions for its organization. The chairperson will gather the committee members who will then be approved by the Board. Stationary and postage will be supplied by the association and the Animal Keepers' Forum will be available to publish information requests and reports to the membership. The final notebook will be published in a format similar to the Infant Development Notebook in that additions may be made as information is available--so this will be an on-going project. All of this is ammendable by your suggestion and board approval.

The value of this notebook is obvious to all keepers and will be a good way for you to contribute to the increasing acitivity of AAZK that benefits all keepers and especially the animals in our care. Please send me your thoughts on this.

This could be a great chapter project, or committee effort.

Sincerely,

*Patricia E. Sammarco*  
AAZK President



# Births & Hatchings

## ST. LOUIS ANNOUNCES RECENT B & H.....Gary A. Michael

The following are the births and hatchings for May 1982 from the St. Louis Zoological Park: 0.0.4 Yellow anaconda, 0.0.1 Satyr tragopan, 0.0.1 Hooded merganser, 0.0.1 Red shoveler, 0.0.4 Argentine cinnamon teal, 0.0.1 Puna teal, 0.0.1 Ashy-headed goose, 0.0.3 Kookaburra, 0.0.1 Lilac-breasted roller, 1.0 Addax, 0.1 Impala, 0.1 Speke's gazelle, 1.0 Bighorn sheep, 1.0 Gerenuk, 4.2 Pygmy goat, 0.0.1 Douroucouli and 0.0.1 Colobus monkey.

## JUNE B & H AT SAN ANTONIO ZOO.....Cindy Roger

The San Antonio Zoo is pleased to announce the following births and hatchings for the month of June. The Bird Department hatched 1 Ostrich (DNS), 1 American Flamingo, 1 Cuban Whistling Duck (DNS), 3 Red-billed Whistling Duck, 2 Plumed Whistling Duck, 6 White-faced Whistling Duck, 6 Moluccan Radjah Shelduck, 6 Mallard, 1 African Yellowbill Duck, 2 Ringed Teal, 1 Red Crested Pochard, 2 Crested Quail Dove, 1 Grey Peacock Pheasant, 1 Demoiselle Crane, 1 Diamond Duck, 2 Sun Conure, 1 Speckled Mousebird (DNS), 4 Pygmy Kingfisher (2 DNS), 7 Giant Pitta (DNS), 6 Shama Thrush (DNS), 1 Arrow-marked Babbler, 6 Red-billed Buffalo Weaver, and 1 Black-necked Starling.

The Large Mammal Department produced 1.0 Lesser Kudu, 0.1 Sable Antelope, 1.0 Topi, 2.2 Impala (1.1 DNS), 0.1 Grant's Gazelle, 1.0 Arabian Sand Gazelle, 0.1 Thomson's Gazelle and 4.0 Springbok (2.0 DNS). 1.1 Rocky Mountain Goat was born in Small Mammals. The Aquarium hatched 6 Filamentus Barb, and the Reptile Department hatched 2 African Fat-tailed Gecko (DNS) and 3 Taylor's Cantil (DNS).

## NZP'S PANDA HOUSE CLOSSES IN PREPARATION FOR POSSIBLE BIRTH

The Panda House at the Smithsonian Institute's National Zoo closed on 13 July to the public. The temporary closing of the building is a precautionary measure to provide the giant panda, Ling-Ling, who may be pregnant, with the privacy she will need to raise a cub. Ling-Ling was artificially inseminated by veterinarians at NZP on 19,20 and again on 21 March of this year. The artificial insemination was undertaken after Ling-Ling had failed to mate naturally with Hsing-Hsing, NZP's male. To date, the Zoo scientists have not been able to determine whether or not Ling-Ling is pregnant. Pandas weigh only four to five ounces at birth and pregnant pandas exhibit little change in appearance. A closed circuit television system will be installed so that Ling-Ling's behavior can be monitored by Zoo scientists.

## CALIFORNIA ALLIGATOR FARM REPORTS HATCHINGS.....Ted Daehnke

The California Alligator Farm, Buena Park, CA, is pleased to report the following successful hatchings for June 1982: Chinese Cobras, Banded Cobras and Three-toed Box Turtles.

## BIRTHS AND HATCHINGS, continued

### RIVERBANKS ZOO ANNOUNCES B & H FOR 1ST HALF OF 1982.....Tony Vecchio and Lex Glover

Once again we would like to report on our births for the first half of 1982. It's been an exciting year for both the mammal and bird departments. Both of our pairs of Golden lion tamarins produced twins; three of which are doing well with their mothers and one that is being hand-raised by keepers and hospital staff. We also had our first Hoffman's sloth and mother-raised California sea lion.

Other mammal births include: 1 Matschei's tree kangaroo, 2 Bennett's wallaby (1 DNS), 2 Dama wallabies (2 DNS), 1.1 Ground cuscus, 1.0 Gibbon (hybrid), 1 DeBrazza monkey, 1 Dusky titi monkey, 2.0 Cotton-top tamarins (2 DNS), 2 Ruffed lemurs (2DNS), 2 Black howler monkeys, 1 Rock hyrax (1DNS), 1.1 Reticulated giraffe (1.0 DNS) 0.1 Chapman's zebra (DNS) and 1.0 Cape eland (DNS).

In June of 1980, Riverbanks Zoo received a collection of African finches. Two of the species that bred are especially noteworthy and to the best of our knowledge are the first recorded hatchings of these species in the U.S. The Bluebills (*Spermophaga haematina*) successfully raised young on 19 March 1982. To date, these birds have produced 18 offspring. The second species, the Crimson seedcracker (*Pyrenestes sanguineus*) have produced two clutches with three and four chicks fledging. Other hatchings include: 1 Luzon bleeding heart dove, 4 Black-footed penguins, 2.1.2 Nene goose, 2 Eclectus parrot, 11 Ringed teal, 2 Germaines peacock pheasant, 5 Bali mynah, 5 Bluebill weaver, 1 Red-crested touraco, 2.3 Cape teal, 1.5 Black-necked swan, 1 Schclow's touraco, 4.4 Red-crested pochard, 0.1 Mute swan, 3 Gouldian finch, 7 Sun conure, 7 Crimson seedcracker, 1 Black head carque, 1 Green jay, 2 Blue-and-gold macaw, 25.11 wood duck, 3.7 Hooded merganser, 6.8 Mandarin duck, 3.7 Radjah shelduck, 2 Stella lory, 1 Roul roul, 1 Military macaw, 1 Laughing thrush, 3.4 Ruddy duck and 4.0 Falcated teal.

### NOTEWORTHY HATCHINGS FROM CININNATI.....Bill Maynard

Successful hatchings at the Cincinnati Zoo so far in 1982 include: 1.1 Andean Condor (see article in this issue), 1 Dusky Lory, 2 Green-naped Lorikeets, 5 Rothchild's Mynah, 6 Roadrunners, 3 Grey Peacock Pheasants, 2 Blue-and-gold Macaw and 1 Grand Eclectus Parrot.

### THIRD GENERATION CHIMP BIRTH AT LINCOLN PARK.....Pat Sammarco

A third generation captive-born chimpanzee was born at Lincoln Park Zoo on 30 April 1982 and is being raised by its mother. The infant was born to female "June" by father "Sam". "June" was born to mother "Patsy" by father "Keo" in September of 1965. "Patsy" was born at the Staten Island Zoo. This is "June's" second live birth - the first is being mother-raised and one other was stillborn.



# Coming Events

## SECOND ANNUAL CONFERENCE ON ZOO RESEARCH

August 26-27, 1982

Cincinnati, OH

Hosted by the Cincinnati Zoo and Kings Island Wild Animal Safari. For information contact Dr. Betsy Dresser, Dir./Research, Cincinnati Zoo/Kings Island, 3400 Vine St., Cincinnati, OH 45220. (513) 281-4701.

## AAZPA ANNUAL CONFERENCE

September 19-23, 1982

Phoenix (Scottsdale), AZ

## 8th NATIONAL AAZK CONFERENCE

October 3-7, 1982

Toronto, Ontario, Canada

## THIRD ANNUAL ELEPHANT WORKSHOP

October 9-10, 1982

Springfield, MO

## SECOND ANNUAL ZOO HORTICULTURE CONFERENCE

October 18,19 & 20, 1982

Wichita, KS

Hosted by Sedgwick County Zoo. For more information and a tentative schedule contact Virginia Wall, Horticulturist, Sedgwick County Zoo, 5555 Zoo Blvd., Wichita, KS 67212 (316) 942-2212.

## 5th ANNUAL CAPTIVE WILDLIFE SYMPOSIUM

October 29-31, 1982

Louisville, KY

Theme for this year's Symposium will be "The Importance of Zookeeping in the Breeding and Reproduction of Exotic Species". Persons interested in presenting a paper should send an outline/abstract to Steve Taylor, c/o Louisville Zoological Garden, 1100 Trevillian Way , Louisville KY 40213.

# Keeper's Alert

## KEEPER'S ALERT

The American Association of Zoo Keepers, Puget Sound Chapter, has recently mailed out a survey to determine levels of participation and interest in staff exchange programs. If, despite our efforts to be thorough, we have managed to miss your institution, and you want to receive the survey, please call or write: Elandra Aum, Staff Exchange Team, Woodland Park Zoological Gardens, 5500 Phinney Ave. North, Seattle, WA 98103 (206) 625-5402. Please include Institution and Director's names and complete address.

# The Endangered Species Act . . . . AN UPDATE

## IN UNEXPECTED ACTION, HOUSE AND SENATE UNANIMOUSLY PASS ENDANGERED SPECIES REAUTHORIZATION

House Merchant Marine Chairman Jones' (D-NC) assertion that his committee "worked long and hard to fashion a package of amendments which is constructive, thereby defusing what just a few months ago shaped up as a major legislative battle between conservation and development" proved to be right on target as the 3-year Endangered Species Act reauthorization bill breezed through the House on 8 June. The Senate took note and approved its bill unanimously the following day.

S2309 and HR6133 extend the Act through fiscal year 1985 at current funding levels, ensure that decisions to list species are made solely on biological information (leaving to the exemption process the balancing of economics and biology), and speed up the process by which species are added or subtracted from the endangered/threatened lists. Both contain provisions to encourage reintroductions of endangered species populations, handle incidental killings, and overrule the court decision regarding bobcats and population estimates. Differences are to be reconciled in conference this summer, with presidential approval prior to 1 October.

"This legislation was not designed to strengthen or weaken the Act, but simply make it work better," asserted Breaux (D-LA). "The facts do not support the assertion that the Endangered Species Act has blocked the development of American industry," said Forsythe (R-NJ). "What the act has done is inject a new consciousness into the process by which industrial growth is achieved...an awareness of the economic, medical, and aesthetic importance of endangered species."

---NWF Conservation Report  
16 June 1982

## EDITORIAL/OPINION: The Endangered Species Act: A Time for Thanks and a Time for Renewed Effort

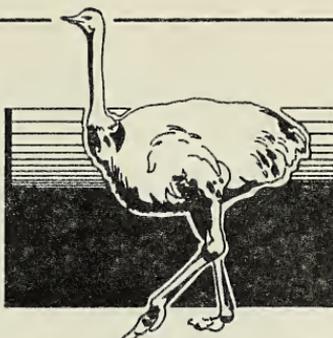
The Endangered Species Act is one of this nation's foremost wildlife conservation laws. It serves as a model for international efforts to preserve biological diversity. The Act's long, painstaking development clearly demonstrates a continuing congressional commitment to conservation of endangered species and their habitat. By unanimously reporting S2309 and HR6133, which amend and reauthorize the Act for three years, the Senate Environment and Public Works Committee and the House Merchant Marine and Fisheries Committee have strongly re-affirmed this commitment.

The National Wildlife Federation supports both measures, while recognizing that differences needed to be resolved. Following careful consideration and consultation with interested parties, Sens. Chafee (R-RI), Mitchell (D-ME), and Gorton (R-WA) and Reps. Breaux (D-LA) and Forsythe (R-NJ) crafted legislation that balances many varied interests and was acceptable to most conservation and industry groups. S2309 and HR6133 improve the Act by: separating economic considerations from biological listing decisions, expediting the listing process, establishing experimental population categories, overturning the "bobcat decision," and providing a 3-year reauthorization. S2309 also protects against the taking of endangered plants on federal land. The bills offer solutions to problems identified by industry, such as establishing conservation plans for endangered species taken incidentally during construction and operation of approved projects.

NWF applauds the achievement of Chafee, Mitchell, Gorton, Breaux and Forsythe.

---Conservation Report  
National Wildlife Federation  
16 June 1982





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## Bird Calls

### It's A Boy! It's A Girl! It's One Of Each!

By  
Bill Maynard  
Head Aviculturist  
Cincinnati Zoo

During the past few years, the Cincinnati Zoo has been working on a breeding program for its pair of Andean Condors (*Vultur gryphus*). The female belongs to the Cincinnati Zoo and the male is on breeding loan to us from the San Diego Zoological Garden.

The pair of birds are housed in an outdoor flight facility measuring 15.2m X 6.09m X 4.87m. There is a simulated cliff area made of Gunitite and two large trees for perching. A waterfall flows over the cliff to a shallow pool below measuring 3.04m X 1.52m X 20.32cm. In the fall of 1980 a large nesting box measuring 1.00m X 2.00m X 1.00m was added to the exhibit in preparation for the 1981 breeding season. The nesting box was positioned on top of the cliff area. The floor of the nest box was covered with 5.00cm of white Silica sand.

Intense courtship was observed on 22 January and on 6 March of 1981 and breeding was observed on 27 March 1981. On 18 April, 1981, twenty-two days later, a single white egg was seen in the nest box. Both the male and the female shared in the incubation duties occasionally fighting vigorously over who was to incubate next. After 65 days of incubation (normal incubation time being 55-58 days) the egg was found broken with no evidence of a chick having been present. No further eggs were laid that year. Again, anticipating breeding and egg production, the nest box was cleaned out and fresh sand was placed on the floor of the nest box. This practice should be done well in advance of the upcoming breeding season.

On 12 February 1982, breeding was observed and on 1 March 1982 one egg was seen in the nest box. Fourteen days later the egg was found broken. At this point, it was decided that all future eggs would be pulled and artificially incubated. Breeding was again observed on 26 March and an egg was found on 29 March 1982. The egg was immediately retrieved from the nest box and placed in our incubator. Surprisingly little resistance was offered by the pair of adult birds. Breeding continued and on 6 May 1982 a third egg was found in the nest box. This egg was also pulled and placed in our incubator.

The eggs were incubated in a Petersime Incubator Model No. 1 at 97½° F. dry bulb temperature and 86°F. wet bulb temperature. Seven days after each egg is set, the egg is candled to determine fertility. Both of the Condor eggs were found to be fertile.

On 22 May 1982 the first egg pipped and 72 hours later hatched. The chick was a female (Alfalfa Louise) weighing 222.7 grams. On 26 June 1982 the second egg pulled was found pipped and 96 hours later hatched. This chick was a male (Sidney Alexander) and weighed 190.5 grams.

Both chicks are being hand-raised on a diet of Ground Meat (½ horsemeat/½ pink mice) to which is added 1 Entozyme Tablet, 1 Calcium Lactate Tablet, Petdrop vitamins, and water. The chicks are fed every 3 hours from 6 A.M. to 6 P.M. Naturally, amounts of Ground Meat and Water are varied as the chicks grow.

The current status of the chicks stands as follows:

Alfalfa Louise	3090.0 grams at 40 days
Sidney Alexander	309.5 grams at 7 days

For additional information feel free to contact me at the Cincinnati Zoo, 3400 Vine Street, Cincinnati, OH 45220.



CONDOR PAIR LOSES AGAIN

The pair of California condors (*Gymnogyps californianus*) that accidentally destroyed their egg in late February laid a second egg in early April, but invading ravens made this second attempt at producing a chick another failure.

Biologists with the Condor Research Center first saw the second egg on 8 April, when the female rolled it out of a dark corner in the nest cave into the view of an observation post ½ mile away. The egg was thought to have been laid the previous day, judging from the female's behavior, in a cave about 100 yards from where the pair produced their first egg. Both sites are in a remote region of northeast Ventura, CA.

On 29 April, the female condor approached the nest to take its turn incubating the egg, but was chased away by the male. A raven (*Corvus corax*) quickly took advantage of the opportunity to enter the nest cave and began to peck at the egg, apparently puncturing it. The returning female at first tried to incubate the damaged egg, but it was soon clear that the egg was crushed. On the following day, a pair of ravens again approached the nest site and, in the ensuing fight, managed to drag away part of the eggshell.

The condor pair's first egg, laid on 14 February, was lost over the edge of a cliff 12 days later as the birds fought over which would incubate it. They are thought to be the same pair that successfully fledged a chick 2 years ago after a similar dispute.

Despite the double tragedy, there are new grounds for optimism about the future. "This is the best evidence yet that the critically endangered California condor will renest after a nesting failure early in the breeding season," said Dr. Noel Snyder, co-leader of the center. Relaying after an early egg loss has long been known for captive Andean condors (*Vultur gryphus*), but whether it might be true for the California condor had not been fully confirmed until now. This proof of natural double clutching is important to the upcoming captive breeding program for the California condor. Further weight has been given to the belief that a captive population could be established by taking wild eggs for artificial incubation without significantly affecting the wild population. Captive reproduction of Andean condors was multiplied several times the natural rate at the Patuxent Wildlife Research Center in Maryland. Researchers hope to duplicate this success with the California species at the San Diego Wild Animal Park and the Los Angeles Zoo when free-flying immatures are captured under a permit issued recently.

---Endangered Species Technical Bulletin

# Primate Profiles

## SPIDER MONKEY BREEDING AT THE CALIFORNIA ALLIGATOR FARM

By  
Ted Daehnke, Reptile Keeper  
California Alligator Farm

The birth of a Spider Monkey (*Atles geoffroyi*) in May increased our collection to six, four of which were born here at the Alligator Farm. The adult male, Peanuts, was imported in 1959 and the adult female, Corky, was received as a donation in 1970. No attempt has been made to keep these animals tame and although they shake hands and accept food through the bars, their enclosure is never entered unless they are first trapped in a small holding section at the back of the unit.

Their first offspring, a female we named Goobers, was born in September of 1974. Corky showed no inclination to cut the cord, so the curator lured her to the side of the enclosure and held her while the job was done through the fence. She fought while she was being restrained, but calmed immediately once released and successfully raised the baby by herself. Corky's second offspring, Miss Peabody, was born in December of 1976 and again Corky showed no inclination to cut the cord by herself. When the curator approached, she rushed to the fence and tried to attack him, but calmed down once the cord had been cut. Corky's third offspring, Mr. Bill, was born in September of 1979 and again she showed unusual aggressiveness toward the curator which immediately subsided once the cord had been cut. Corky not only calmed down immediately, but seemed even more affectionate than usual, as though trying to make up with the curator.

Goobers became pregnant in 1981, but lost the baby in March. In 1982, both Goobers and Corky appeared pregnant and on May 17th Goobers was found nursing a baby. The monkeys had cut the cord themselves and cleaned up all signs of the placenta. In the three previous births assistance was required in cutting the cord and the placenta was removed from the exhibit. Both females no longer appeared pregnant and both showed some signs of bleeding, so we weren't certain which female was the mother. While Goobers nursed the new baby, Corky attempted to get Mr. Bill to resume nursing even though he had not nursed for over a year. Five days after the baby was born, Corky took it from Goobers and has successfully nursed it since that time.

Some of the behavior patterns exhibited by these monkeys seem unusual to me. Corky's aggression towards the curator at the birth of her second and third babies looks like an attempt to get the cord cut learned from her experience with her first baby. The fact that the fourth baby's cord was cut by the monkeys might indicate that Goobers cut it by instinct or that Corky finally learned to do so herself or that the interaction of two adult females was necessary to get the cord cut.

Since both females appeared pregnant, both seemed to show signs of having given birth and both were able to nurse the baby, it seems likely that one of them lost her baby and that the dead baby and both placentas were cleaned up by the monkeys. The fact that Corky eventually retained possession of the infant might be a result of her dominance and no real indicator of who the true mother was. I would like to hear from primate keepers with Spider Monkey experience who might have explanations for these behavioral patterns. Those wishing to correspond may write to me c/o California Alligator Farm, Box 236, Buena Park, CA 90621.



# Chapter

By Patti Kuntzmann  
Coordinator for Chapter Affairs

## Message to all Chapters from your Chapter Affairs Coordinator

First, I'd like to congratulate Miami on being the most communicative chapter in the country! Their determination and enthusiasm can be an inspiration to all of us. I would like to formally invite all chapters to let me know their news. It would be sufficient if you just sent the minutes of your meetings whether they be held monthly, bi-monthly, semi-annually, etc. I look forward to hearing from all of you. We are all friends and we must work to create a strong bond to succeed! We must all strive to make AAZK a strong organization of people dedicated to the best in animal care. Please let me hear from your chapter, communication is the heart of any organization!! My address is:

Patti Kuntzmann  
Coordinator for  
Chapter Affairs  
c/o Philadelphia Zoological  
Society, 34th and Girard Ave.  
Philadelphia, PA 19104

I'll be waiting for a flood of letters! Good luck to all of you, in everything and Happy summer!

## Miami AAZK Chapter

They made over \$800 on their keeper raffle. It seems to have been a great success. They are working with the Miami Audubon Society to help create some brochures that will educate the general public on nesting sea turtles. They are also putting money toward the manatee foundation.

In April the monthly meeting was held at Dreher Park. Their speaker was the Director who gave a slide program on the flood that overran the zoo a few weeks before. The keepers there were unprepared for the disaster. The chapter learned a lot about how to handle and prepare for similar disasters. This

is a very important subject. It would sure be great if this information could be shared at a future conference!

The chapter had a "Dog Wash" in May. Also May's meeting was held at the Audubon house with their president, Bob Kelly, as the speaker. He gave an excellent presentation on the nesting turtles. Good work, Miami!

# News

## Atlanta Zoo AAZK Chapter

The Atlanta Zoo Chapter has been involved with production of signs for the animal enclosures since January 1982. The first signs, using the silkscreen technique, were installed in the Children's Zoo in April. Signs are now being produced for the Bear, Sea Lion, and Hoofed Animal areas. Each sign includes the animal's common and scientific names, their diet in the wild, and a brief text. A range map is also included. Our goal now is to produce signs for all animal exhibits. We will also be producing directional, restroom, and "DO NOT FEED" signs. At a later date, as we gain more experience, we plan to do more elaborate and detailed labels and diaramas, which will deal with specific topics such as locomotion, habitat and conservation.

Most of our chapter funds come from the selling of manure from the Elephant and Hoofed Animal areas. We have named this service the "Feces from all Species" Manure Co. with Ruth Vischer as acting President.

We now have seven professional members and one affiliate, with five as chapter members. Our most recent member is Cathy Taibbi, a Children's Zoo keeper. Cathy is very interested in Psittacines and is an accomplished artist. We are proud to welcome Cathy to our chapter.



## AAZK RESEARCH COMMITTEE REQUESTS APPLICANTS

A research Committee has been established by the Board of AAZK. Its purpose is to encourage research to be conducted by keepers in zoos and aquariums. Grant applications will be accepted from 1 September to 1 December of each year. The screening of applications will be completed by 1 January 1983 when project funding will be approved.

The Research Committee members are: Mike Coker, Chairman; Frank Kohn, Research Advisor; Pat Sammarco, Kevin Conway, Mike Maybry and Jill Grade. Direct inquiries to Topeka Zoo, c/o Mike Coker, 635 Gage Blvd., Topeka, KS 66606.

### Qualifications:

1. Keepers would submit a research proposal to the committee for approval. Upon approval of a project, funding would be available. The funding furnished by AAZK would be to offset expenses such as a computer work, data collection, stationary, supplies, telephone expenses, library expenses, etc.

2. The funding would not exceed \$250.00 for a 12 month period. Funding would not be applicable (a) for purchase of any living animal specimens for a project, or (b) to offset or pay any wages of a keeper.

3. The project must be finished in 12 months. The written paper will be presented to the Research Committee at that time. If the project is not finished, then the recipient must present a status review of the project. The recipient can reapply for an additional 12 months period. Re-application would not be accepted after a 24-month time for the project.

4. The written report of the finished project must be filed with the AAZK Research Committee and one copy filed with the *Animal Keepers' Forum*. AKF will be the first publisher for the project. After being printed in AKF, it may be reprinted by permission of the author and AKF editorial staff.

5. To qualify for funding, the recipient must be a full-time and permanent keeper with at least two years' experience in the zoo and aquarium field.

6. Recipients of the funds must account for their use in a written report to the Committee.

The Committee can be invaluable for encouraging on-the-job, quality keeper research. The Committee will not fund more than four projects per calendar year. A recipient funded for 1 year must reapply for funding extension. Funding is not automatically given unless the Committee rules it to be.

The Research Committee can terminate a recipient's project by notification in writing. Termination of the project would result from known violations of project restrictions.

The Committee's purpose must be to help fund, totally or partially, small research projects conducted by keepers. This will help zoo keepers develop into zoo professionals as a permanent career.



# Research.....

## PRIMATE PREDATION REPORT: SURVEY RESULTS

By

Susan Clarke and G. Mitchell  
Psychology Department, University of California  
Davis, CA

We recently published a request for information on captive primate predation in the form of a survey in Animal Keepers' Forum (8(8), 1981) and in several other publications read by primate keepers and investigators. The results of this survey are reported here.

Twenty responses to the survey were received, many of which were completed by primate keepers. Most survey responses reported more than one predatory incident. Many responses contained reports of predation by more than one primate species, or of predation upon more than one prey species. The quality of information ranged from sketchy and anecdotal to precise and detailed. Incomplete reports were usually based on remains found in cages by keepers. A few reports described unsuccessful attempts at prey capture, or reactions to live or freshly killed animals offered as a dietary supplement. Results from responses to the survey are summarized in TABLE I (see following page) according to predator species.

There were few reports of insect-eating by captive primates, perhaps because many observers did not consider this a noteworthy behavior, or because insect-eating occurred rapidly, so that it went unnoticed. Reports of predation on fish, reptiles or amphibians were also rare, probably because these prey items are seldom available in the habitats of captive primates. The *Cebus apella* (reported in the Table to eat fish) were kept on a man-made island at Busch Gardens, FL. This group was observed to catch and eat fish nine times during a three-month period. All parts of the fish except bones and scales were consumed. The *Saimiri sciureus* group described by Judge were kept in an outdoor "tropical rainforest" environment by Monkey Jungle, FL. Judge believed the predation of these animals on bullfrogs to be a common occurrence, limited by prey availability.

Reports of predation upon mammals were also rare, again probably due to scarce availability in captive primate habitats. Most reports were inferred from remains found in enclosures by keepers.

Birds, especially sparrows, were the most commonly reported prey item of captive primates. Capture of birds, where witnessed, was always reported to be a "pounce and grab" technique. Birds were typically killed by a bite to the head or neck region (a craniocervical bite; see Steklis & King, 1978). Usually most parts of the birds were eaten except the feathers and bones.

The frequently reported predation upon birds, and upon sparrows in particular, may be due to the probability that these were the most available prey to captive primates. Birds are frequent visitors in outdoor primate enclosures, being attracted by monkey chow and other foods. This may result in birds being relatively easy prey for captive primates. Chain link enclosures require that most birds must land on sections of the fence to enter or leave an enclosure, making escape difficult for a frightened and pursued bird. The capture of birds is likely to be highly visible to keepers and observers, and usually causes general excitement in a primate group (attempts at food snatching, etc.). Furthermore, bird prey leave visible remains (feathers and bones) to be found by keepers. However, birds entering an enclosure are often ignored by captive primates. Thus, it is not clear exactly what variables may trigger a predatory response.

TABLE I  
Predator Species, Prey Species, and Sources

<u>Predator Species</u>	<u>Prey Species</u>	<u>Captive Environment</u>	<u>Source</u>	<u>Notes</u>
<u>Daubentonia</u> <u>madagascariensis</u>	human (finger)	indoor	Roy	bitten off
<u>Nycticebus couacang</u>	crickets, mealworms	indoor, nocturnal lighting	Waterstradt	offered live in diet
<u>Galago crassicaudatus</u>	mice	indoor, nocturnal lighting	Henley, Brooks McCleary	remains found in cage 3 times
<u>Saguinus oedipus</u>	insects, house finches	indoor/outdoor	Smith	insects caught daily, finches occasionally
<u>Saimiri sciureus</u>	insects, bullfrogs	semi-free ranging	Judge	occurred frequently
<u>Saimiri sciureus</u>	crickets	indoor	King	occurred frequently
<u>Saimiri sciureus</u>	chick	indoor	Hopf	offered dead in diet, eaten by only 1 animal
<u>Cebua ( 3 unnamed spp. )</u>	pigeon	manmade island	Dolgin	1 incident food snatching
<u>Cebus apella</u>	insects, fish	manmade island	Breuggeman Heeschan	9 fish incidents, food sharing and snatching. Long consumption periods ( more than 5 hrs. )
<u>Lagothrix lagothricha</u>	sparrows	manmade island	Marshall	remains found several incidents
<u>Macaca fascicularis</u>	sparrow	outdoor corral	Koyama	1 incident seen
<u>Macaca arctoides</u>	rat pup	outdoor/indoor	Chamove	offered dead, partially consumed by 1 animal

<u>Cynopithecus niger</u>	pea chicks	outdoor	Albert	killed but not eaten (? times)
<u>Mandrillus sphinx</u>	sparrows	outdoor/indoor	King	2 incidents
<u>Mandrillus sphinx</u>	pea chicks	outdoor	Albert	killed but not eaten, 7 incidents
<u>Cercopithecus aethiops</u>	birds	outdoor	Bramblett	several incidents
<u>Cercopithecus aethiops</u>	bat	outdoor	Bramblett	1 incident, remains found in cage
<u>Cercopithecus cephus</u>	sparrows	outdoor/indoor	Ward	"common practice"
<u>Cercopithecus cephus</u>	sparrow	outdoor	Albert	frequency unknown
<u>Cercopithecus cephus</u>	bird	outdoor	Bramblett	1 incident, remains found in cage
<u>Cercopithecus diana</u>	crickets cockroaches	indoor	King	frequent occurrence
<u>Cercopithecus diana</u>	blackbird	outdoor	Taylor	1 incident seen
<u>Cercopithecus metis</u>	lizard	outdoor	Bramblett	1 incident seen
<u>Cercopithecus mitis and petawista (Housed together)</u>	bird	outdoor	Bramblett	1 incident recorded
<u>Hylobates lar</u>	grackle	outdoor	Albert	killed but not eaten 1 incident
<u>Symphalabagus syndactylus</u>	chicken	outdoor	Baldrige	unsuccessful capture attempt
<u>Pan troglodytes</u>	opossum	outdoor	Alford	killed, but prey removed before possible consumption could begin



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Discussion

Most primates are considered to be omnivorous, with the consumption of animal protein presumed to be a small but necessary part of the diet (Sussman, 1978). All primate species reported here to be captive predators are also known to eat some form of animal protein in the wild (Gaulin & Konner, 1977). Predatory behavior appears to be relatively common among captive primates and cannot be considered an artifact of captivity. It is possible that predatory behavior may be exaggerated in captivity in some cases, where some prey (e.g. birds) are more available or easier to capture than in the wild. It is difficult to speculate on the possible nutritional significance of predation by captive primates, though most captive diets are thought to include more than the amount of non-animal protein necessary for good health. Thus it is suggested that predation by captive primates is a behavioral inclination, rather than one based on nutritional needs.

Predation by captive primates may also have implications for management and husbandry. Carcasses left in enclosures that are difficult to clean (e.g. grass- or dirt-floored, outdoors) pose problems for keepers and may be health hazards. Some insects which may be eaten by primates are intermediate hosts for intestinal parasites. Where insect predation by captive primates is suspected to be frequent, staff may wish to periodically monitor fecal samples for parasite load. Many wild birds are carriers of avian tuberculosis, which may be transmitted to the primates that consume them, resulting in colony health problems. In spite of these potential difficulties, no health problems directly attributable to predation have been reported for any captive primates. Alternatively, in some cases it may be desirable to provide opportunities for predation to captive primates where practical. Predation may serve to supplement captive diets and may provide opportunities for study of this interesting behavior. The encouragement of predation provides an opportunity for captive primates to exercise their natural predatory inclinations and, in some instances may increase social interaction (Brown & Mack, 1978) or help to elucidate social relationships. Predatory opportunities might serve educational purposes in zoos, although many zoos will probably still be reluctant to display this type of behavior to the public. In summary, predation by captive primates appears to occur more commonly than previously believed and may be related to environment and to prey availability. Further studies of predation by captive primates may identify other variables associated with this behavior.

Acknowledgements: We thank Susan Chan and Animal Keepers' Forum for assisting us with this survey. We also thank all those who responded to the survey and generously provided us with information.

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# Legislative News

Compiled by Kevin Conway

## TEXAS, INTERIOR, PROPOSE TO JOINTLY MANAGE WHOOPING CRANE ISLAND

In a surprise move, the Department of the Interior and the State of Texas unveiled a compromise on the control and management of federal lands on Matagorda Island before the House Subcommittee on Fisheries and Wildlife Conservation and the Environment on 5/26. The federal government owns 19,000 acres of the island's uplands, managed as part of the nearby Aransas National Wildlife Refuge. The barrier island lying 35 miles offshore from Corpus Christi hosts several endangered species, including wintering whooping cranes.

For several years, Texas has pushed for transfer of the federal portion of the island to the state. Under the compromise, the land will remain under federal jurisdiction but be managed on a day-to-day basis by the Texas Department of Parks and Wildlife through a lease or easement. In return, Texas would give the U.S. Fish and Wildlife Service a conservation easement over the island's 20,000 acres of state-owned coastal wetlands. State management would depart very little from current practices: endangered and migratory species would receive priority, no causeway or commercial structures can be built, and no vehicles would be allowed. Compatible, low-intensity recreational use could continue. The cooperative plan would contain reporting requirements to ensure state compliance and a reverter clause to return the land to federal control if Texas fails to comply.

The action was opposed by Audubon, the Wilderness Society and the Defenders of Wildlife who voiced concern over the strong recreational emphasis of other Texas Parks and Wildlife Department areas, even to the point of bending rules. All three groups supported continued federal management of Matagorda.

---Conservation Report  
National Wildlife Federation

## USFWS PROPOSES DEREGULATION OF BLUE PIKE

The USFWS has proposed the removal of the blue pike (*Stizostedion vitreum glaucum*) and the longjaw cisco (*Coregonus alpenae*) from the U.S. List of Endangered and Threatened Wildlife. This action is based on a review of all available data which indicates that these species are extinct. Blue pike populations declined in the late 1950's and never recovered from the last confirmed specimens taken in the 1960's. Historically this subspecies was found in Lake Erie and Ontario and the Niagara River. Intensive surveys by the FWS and States where the species occurred, have failed to yield any additional specimens. In a 1977 survey, the Blue Pike Recovery Team contacted all Fish and Game agencies in the U.S. in an effort to determine if blue pike existed in their waters. After all responded negatively, the Blue Pike Recovery Team concluded that the blue pike was extinct and recommended removing it from the U.S. Endangered and Threatened Wildlife List.

The longjaw cisco is one of several closely related species of ciscos which occur in the Great Lakes. It was known to occur in Lake Michigan, Lake Huron and Lake Erie. Despite the considerable effort of the Service's Great Lake Fishery Laboratory and States around the Great Lakes, there has been no reported collection of this species in U.S. waters since 1967. Recent research has indicated that some species of ciscos in the Great Lakes may constitute hybrid populations.

---Federal Register  
25 May 1982

RACCOON DOG PROPOSED FOR INJURIOUS ANIMAL LIST

The USFWS proposed to amend 50 CFR Part 16 - Importation or Shipment of Injurious Wildlife, by adding the raccoon dog (*Nyctereutes procyanoides*) a nonindigenous predatory mammal of the Family Canidae, to the list of injurious mammals. The best available information indicates that this action is necessary to protect existing fish and wildlife resources from potential adverse effects which may result from purposeful or accidental introduction of the raccoon dog into existing ecosystems of the U.S.

---Federal Register  
Vol. 47, no. 92

AMENDMENT TO MMPA TRANSFERS MANAGEMENT AUTHORITY TO STATES

The U.S. Fish and Wildlife Service is proposing a rule to implement recent amendments to the Marine Mammal Protection Act. The proposed regulations establish procedures for the transfer of marine mammal management authority back to the States, the form and minimum requirements of a State application for the transfer of management authority, the relationship between Federal and state wildlife agencies both prior and subsequent to the transfer of authority and the revocation and return to the USFWS of management authority once transferred to the States.

---Federal Register  
Vol. 47, No 92

FOOT-AND-MOUTH DISEASE CONFIRMED IN DENMARK

The Department of Agriculture, Animal and Plant Health Inspection Service (APHIS), was notified in March that foot-and-mouth disease was confirmed on the Isle of Flyn, a part of Denmark. On 24 March, APHIS published notification in the *Federal Register* removing Denmark from the list of countries declared free of rinderpest and foot-and-mouth disease. The effect of this publication is to prohibit or restrict the entry of certain animals and animal products from Denmark into the United States.

---AAZPA Newsletter

LIST OF ENDANGERED SPECIES AVAILABLE

The USFWS announces the availability of the lists of Endangered and Threatened Wildlife and Plants, 50 CFR 17.11 and 17.12. This publication was reprinted from the October 1, 1981, Title 50 of the Code of Federal Regulations, Part 17, and updated through January 1, 1982. Copies of this publication are available through the Office of Public Affairs--Publications, U.S. Fish and Wildlife Service, Washington, D.C. 20240.

---Federal Register  
Vol. 47, No. 123

CRITICAL HABITAT DETERMINED FOR HAWSKBILL SEA TURTLE

The USFWS has determined Critical Habitat for the hawksbill sea turtle

(*Eretmochelys imbricata*) in the Commonwealth of Puerto Rico. Nesting of this species occurs in scattered localities throughout the Caribbean although in no place is nesting as abundant as in the past. The beaches on Mona Island represent a significant nesting area for this species in the Caribbean and were singled out as of major importance at the World Conference on Sea Turtle Conservation held in November 1979 in Washington, D.C. Areas on the islands of Culebra, Culebrits and Cayo Norte are also regularly used by nesting hawksbill.

The hawksbill sea turtle is a rare and critically endangered reptile throughout the world and has been officially listed as Endangered since 1970. Much of the hope for survival and recovery of this species depends upon the maintenance of suitable and undisturbed nesting beaches and the protection of nesting beaches is a strategy endorsed by scientists throughout the world for the conservation of this species. The FWS recognizes that areas containing such beaches may qualify for recognition as Critical Habitat as referred to in Section 4 of the Act, thereby providing additional protection through Section 7.

In accordance with the July 18, 1977, Memorandum of Understanding between the FWS and the National Marine Fisheries Service, the FWS was given responsibility for sea turtles while on land. Such responsibility includes proposing and designating Critical Habitat. The designation of marine Critical Habitat is the jurisdiction of the National Marine Fisheries Service; therefore this rule includes only land areas.

Hawksbill sea turtles are known to nest on all of Mona Island's 7.2 kilometers of beaches. The offshore areas appear to support a somewhat stable and resident population. In addition, green turtles and rarely, leatherback turtles may also nest on Mona. The designation of Mona Island as Critical Habitat for the hawksbill sea turtle was recommendation number 83 in the World Action Plan for the Conservation of Sea Turtles. The entire island of Mona is already Critical Habitat for the listed yellow-shouldered blackbird, Mona ground iguana, and Mona boas.

Nesting of hawksbill sea turtles occurs on suitable sandy beaches on the north shore of Culebra Island, as well as the nearby islands of Cayo Norte and Isla Culebrita. Turtles are known to feed on the rich offshore reefs around these islands. In addition to hawksbills, occasional nesting has been reported for leatherback, loggerhead and green turtles on these beaches. The Critical Habitat for the Endangered Culebra Island giant anole on Playa Resaca barely overlaps the Critical Habitat of the Hawksbill.

The hawksbill sea turtle is a tropicopolitan species. It occurs in waters off the east coast of the continental U.S. (primarily Florida), the U.S. Virgin Islands, mainland Puerto Rico, the Hawaiian Islands, Pacific Trust Territory, American Samoa, Guam and Territory of the Northern Marianas. Nesting is known to occur very rarely in Florida and more frequently in the Virgin Islands and on remote islands under U.S. jurisdiction in the Pacific Ocean.

The threats to the worldwide apparent decline in populations of the hawksbill sea turtle come from three main sources: killing the animal so that the scutes covering the bony shell may be removed to fashion tortoise-shell items, or the animal may be stuffed and sold to tourists; removal of eggs for human consumption or destruction of eggs by predators;

disruption or alteration of the nesting beaches. Additional problems that this species may encounter include killing for meat (this happens occasionally but hawksbill meat is considered poisonous in many parts of the world), incidental catch in trawls (a minor problem in the Caribbean), accidental entanglement in fishing nets, pollution and destruction of nesting and feeding reefs, and harassment while nesting and swimming. The problems faced by this species were treated in detail at the recent World Conference on Sea Turtle Conservation.

Critical habitat for beaches used by nesting hawksbills in the Commonwealth of Puerto Rico was proposed on May 24, 1978. Those areas were withdrawn from consideration on March 6, 1979 because of the substantive changes made to the requirements for the determination of Critical Habitat by the Endangered Species Act Amendments of 1978. The areas in the final rule are essentially the same as those of the original and subsequent proposal. This rule is in compliance with the requirements of the 1978 and later amendments.

The final rule now requires Federal agencies not only to insure that activities they authorize, fund or carry out are not likely to jeopardize the continued existence of the hawksbill sea turtle, but also requires them to insure that their actions are not likely to result in the destruction or adverse modification of its Critical Habitat which has been determined by the Secretary.

---Federal Register  
Vol. 47, No. 122



## Information Please

HELP -- Our female spider monkey (*Atles geoffroyi*) rejected her first infant. We believe she may be pregnant again. Anyone with information on techniques used to encourage primate infant acceptance, please write: Louise LaRoche, Lafayette Zoological Park, 3500 Granby Street, Norfolk, VA 23504.

---

I am studying social behavior in a pair of Emperor Tamarins (*Saguinus imperator subrisescens*). Since most of my primate behavior studies have dealt with great apes, I am in need of background data on this species. Anyone having such information (including husbandry, breeding, behavior etc.) of the Emperor Tamarins is asked to contact Helen Bathé, 805 Meadowgreen Drive, Midwest City, OK 73110.

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### REPTILE FECES REQUEST

I am compiling a diagnostic atlas of reptilian intestinal parasites and would appreciate any donated feces. I shall provide collecting vials to private collectors and institutions, and will submit a diagnostic report of my findings in return for the feces. There is no charge for this service. Please request your fecal collection vials from Sue Barnard, Senior Keeper, Dept. of Herpetology, Atlanta Zoological Park, 800 Cherokee Ave., SE, Atlanta, GA 30315.

# Conference..... 82

## CONFERENCE NOTES AND REMINDERS

- Mail takes extra time between the U.S. and Canada, so register NOW!
- Make ALL checks payable to "AAZK-Metro Toronto Zoo Chapter"--this includes checks for payment for both registration and hotel reservations. DO NOT make checks out to the hotel.
- The Canadian dollar fluctuates at about 20% below the value of the American dollar. Actual room prices in October may be slightly different than those presently quoted.
- All AAZK members planning to attend the Toronto Conference are asked to remember to bring an item for the auction. The auction is not only a lot of fun for everyone, but helps to offset the Conference expenses. So bring an animal-related item from your zoo and be represented at the Auction.
- There are a limited number of accommodations available with keepers on a first-come, first served basis. Please write as soon as possible if you are interested in staying with a keeper--include number in party, interests, whether vegetarian, non-smoker, etc.

## WORKSHOPS AND TOURS

We have scheduled four workshops for presentation at the conference, as well as a number of less formal tours/group discussions for the two afternoons at the Metro Toronto Zoo.

The workshops are: Women in Zoos, Keeper Education, Keeper Research and Keeper Safety.

The zoo tours/discussion groups are: Zoo Horticulture, Zoo Animal Nutrition, Fish, Reptiles and Amphibians, Herbivores, Carnivores, Elephants, Birds and Camel Training.

There are two post conference tours arranged for Friday, 8 October. These are to the Peterborough Zoo and to the Reptile Breeding Foundation in Picton. Please let us know when you check in, or on your registration form if you are interested in either of these two tours as numbers will be limited.

We will be happy to look at other ideas for workshops or discussion groups, and we hope all delegates will participate with their ideas and information so that we can all benefit by an increase in knowledge.

## TENTATIVE AGENDA FOR THE 8TH NATIONAL AAZK CONFERENCE

### Sunday, October 3

Board Meeting  
Registration  
Icebreaker--Hotel\*

### Monday, October 4

Welcome and introduction  
Coffee  
Tour of Metro Toronto Zoo  
with zoo lunch  
Evening workshops - hotel

### Tuesday, October 5

Papers (all day - hotel)  
Coffee  
Lunch  
Evening workshops - hotel

### Wednesday, October 6

Papers (all morning - hotel)  
Coffee  
Tour of Metro Toronto Zoo  
Volley Ball  
Dinner on the town

### Thursday, October 7

Papers (all morning - hotel)  
Coffee  
Lunch  
General Membership Meeting  
Banquet and Auction - Casa Loma\*

### Friday, October 8

Post-conference tours  
Peterborough Zoo/Reptile Breeding  
Foundation

\*Note: the Icebreaker will be held at the Hotel and the Auction has been changed from Wednesday to Thursday evening.





We are indebted to the AAZPA Newsletter for allowing us to reprint portions of this section from their "Positions Available" listing. This is a monthly service to us, for you.

CURATOR/MAMMALS...under supervision, responsible for mammal acquisitions. Requires Bachelor's Degree in Zoology or related field. Must have writing and speaking abilities. Extensive background in exotic mammal husbandry, with management-level supervisory experience necessary. Background in record keeping desirable. Salary \$19,344-\$28,059, plus benefits. Submit resume by 30 August 1982 to Ingrid U. Schmidt, General Curator, Rio Grande Zoo, 903 Tenth St., SW, Albuquerque, NM 87102.

BIRD DEPT. SUPERVISOR...responsible to curator for collection, husbandry and personnel supervision. Must have strong background in zoological aviculture, plus supervisory experience. Degree in biological sciences helpful or many years practical experience. Salary \$15,345-\$16,272. Reply by 1 September 1982 to Bruce Miller, Oklahoma City Zoo, 2101 NE 50th, Oklahoma City, OK 73111. (405) 424-3344.

ASSOCIATE VETERINARIAN...requires thorough knowledge, training and experience in veterinary medicine, Must have completed post-doctoral training program (internship/residency) in zoological medicine or extensive experience as full-time veterinarian in major zoological collection. Applicant should have demonstrated research potential. Knowledge of surgical procedures is required. Salary \$23,556-\$28,245. To apply, submit a Standard Form 171, college transcript, complete curriculum vitae and resume to Mitchell Bush, D.V.M. Chief, Dept. of Animal Health, National Zoological Park, Washington, DC 20008. EOE.

ASST. CURATOR/ZOO HOSPITAL...responsible professional with B.S. degree in Nursing, Medical Technology or related field or B.S. in Zoology with experience in animal health care center of recognized zoo. Salary \$1,200/mo.; must be available by mid-October 1982. Send resume to Andrew E. Gutter, D.V.M., Audubon Park Zoo, 6500 Magazine St., New Orleans, LA 70118.

CURATOR/EXHIBITS & GRAPHIC ARTS...individual must possess creative talent and a track record in exhibition design. Must be familiar with materials and techniques and have managerial skills. Ability to coordinate contractors and supervise internal personnel is mandatory. Applicants must possess a degree and have at least five years of demonstrated experience. Benefit package. Submit salary requirements and resume to: Personnel Manager, New York Zoological Society, 185th St. & Southern Blvd., Bronx, NY 10460. EOE.

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### CORRECTION

The author of the book review on Animal Behavior (page 162) in the July issue of Animal Keepers' Forum was incorrectly listed as Frank Chiles. The author was Frances Chiles, a Park Guide at the National Zoological Park in Washington, D.C. The editorial staff apologizes for this error.

AAZK MEMBERSHIP APPLICATION

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Mail this application and check or money order, payable to American Association of Zoo Keepers, to: AAZK National Headquarters, Topeka Zoo, 635 Gage Blvd., Topeka, KS 66606.

Membership includes a subscription to the *Animal Keepers' Forum*. The membership card is good for free admission to many zoos and aquariums in the U.S. and Canada

INFORMATION FOR CONTRIBUTORS



*Animal Keepers' Forum* publishes original papers and news items of interest to the Animal Keeping profession. Non-members are welcome to submit articles.

Articles should be typed or hand-printed. All illustrations, graphs and tables should be clearly marked, in final form, and should fit in a page size of no more than 6" x 10" (15 cm x 25½ cm.). Literature used should be cited in the text and in final bibliography. Avoid footnotes. Include scientific names.

Articles sent to *Animal Keepers' Forum* will be reviewed for publication. No commitment is made to the author, but an effort will be made to publish articles as soon as possible. Those longer than three pages may be separated into monthly installments at the discretion of the editorial staff. The editors reserve the right to edit material without consultation unless approval is requested in writing by the author. Materials submitted will not be returned unless accompanied by a stamped, self-addressed envelope.

Telephoned contributions on late-breaking news or last minute insertions are accepted. However, phone-in contributions of long articles will not be accepted. The phone number is (913) 272-5821.

DEADLINE FOR EACH EDITION IS THE 15TH OF THE PRECEDING MONTH

*Articles printed do not necessarily reflect the opinions of the Animal Keepers' Forum editorial staff or of the American Association of Zoo Keepers.*

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SPECIAL EDITION

SEPTEMBER 1982

9/25/82

# Animal Keepers' Forum



## TROPICAL HABITAT EXHIBITS WORKSHOP

TOPEKA ZOO May 7 & 8 1982

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*Dedicated to Professional Animal Care*

Executive Editor: Mike Coker  
 Managing Editor: Susan Chan  
 Associate Editor: Connie Cloak  
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# Scoops and Scuttlebutt

## TROPICAL HABITAT WORKSHOP SPECIAL ISSUE

The Topeka Chapter of AAZK hosted a workshop on Tropical Habitat Exhibits on May 7 & 8, 1982. A gathering of keepers from different zoos is always exciting and this group was especially compatible and diverse. Participants included keepers from every part of the US and from Canada, and with knowledge and interests ranging from horticulture to animal care including mammals, herptiles and birds. The workshop was conceived as a means of bringing together information and ideas from the many institutions which have developed tropical exhibits.

Some of the papers presented are gathered together in this special, expanded issue of AKF. Additional copies may be ordered from National Headquarters for \$1.50 each.

The cover design for this month's AKF and the chameleon logo heading the workshop articles were designed for the Topeka AAZK Chapter by Greg Volpert, a free-lance illustrator and armchair naturalist in Topeka. Greg is interested in designing children's books about animals and would like to hear from aspiring collaborators. He may be reached in care of AKF.

The cover design is available in T-shirts, printed in dark blue on tan or light blue shirts. Specify color and size (sm,med,lg,Xlg) and make checks (\$7.50 per shirt, postpaid) payable to "Topeka AAZK". The address is 635 Gage Blvd., Topeka, KS 66606.

A Second Annual Tropical Habitat Exhibits Workshop will be hosted by the Vancouver Public Aquarium in Vancouver, British Columbia in May '83. Watch the AKF for further details!

## NEW INTERNATIONAL AFFAIRS COORDINATOR NAMED

The Board of Directors of AAZK has approved the appointment of Randy Adolph of the St. Louis Zoo as International Affairs Coordinator for the Association. Randy replaces Karen Starr Wakeland who recently resigned from this post to devote more time to AAZK's film project. The IAC is responsible for communicating and exchanging information with keeper associations in other countries. Congratulations to Randy on his new position.

## COPIES OF AAZK NEWSLETTERS SOUGHT

Copies of AAZK's Newsletter from 1968: Volume I, Issues No. 1 through 4. and 1969: Volume II, Issue No.12 are being sought by the Puget Sound Chapter at Woodland Park Zoo in order to compile a complete set of AAZK publications for the Zoo's library. They have almost succeeded, but need a little help. Do you have these issues? Would you be willing to send them to Woodland Park to be copied, or to provide them with a copy? They will cover all costs. It has been suggested that there might not have been an Issue 12 in 1969. Can anyone verify that? Please contact Judie Steenberg, Woodland Park Zoological Gardens, 5500 Phinney Avenue No., Seattle, WA 98103.

# Keeper's Alert

## AAZK KEEPER EDUCATION COMMITTEE UPDATE

By *Judie Steenberg*  
Unit Keeper, Woodland Park Zoological Gardens

What can be accomplished in this area within AAZK? Where is the greatest need for Keeper Education? Is a "general" program for all zoos possible? How can you help?

The need for Keeper training has been around since the beginning of animal keeping. It requires an on-going learning process that deals with continuous changes in species, environments, exhibits, husbandry techniques, philosophy, politics and policies. There are various levels of Keeper training to be considered and several ways to accomplish them. While some zoos hire experienced Keepers and give sufficient attention to additional training and education, others hire inexperienced help and rely upon on-the-job training.

In addition to remaining open-minded and flexible to allow for this on-going learning process to have an effect, there is a responsibility in our profession to share our knowledge and experiences with others. How can AAZK help accomplish these goals?

First, we can't hope to satisfy the needs of all Keepers and all zoos. Between now and the Toronto conference, a committee of interested, willing-to-work AAZK members will take an objective look at this complex subject. We will try to determine a realistic approach to Keeper education within AAZK's capabilities; a program that could be adapted to suit individual needs.

Are you interested in being involved in this project? Do you have suggestions or ideas to share? Take a look at your immediate situation and your zoo...where do you see a need? What have you learned; what is the Keeper training program like at your zoo? Do you have a specific area of interest or an expertise that could be shared with others? We are interested in hearing from all members, even if you aren't able to serve on a committee.

AAZK is your organization; your profession is your responsibility. How can you help insure that professional animal keeping standards are improved and maintained?

It would be surprising if you didn't have something to share...an idea, suggestion, disappointment, a keeper training program that works, or doesn't, and why you think so. We want to hear from YOU.

There will be an Education Workshop at the Toronto conference. We would like to have your input before then. Please take a few minutes right now and put your thoughts on paper; send them to: Judie Steenberg, Woodland Park Zoological Gardens, 5500 Phinney Avenue No, Seattle, WA 98103



# Births & Hatchings

## CALDWELL ZOO ANNOUNCES 1982 BIRTHS AND HATCHINGS.....*B.R. Smith*

The Caldwell Zoo, Tyler, TX, is pleased to announce the following births and hatchings for the first half of 1982: 1.1 Reticulated giraffe, 1.2 Aoudad, 0.0.2 Ring-tail cats (DNS), 1.1 Gray Fox, 0.1 Sicilian donkey, 12 East African Crowned Cranes (5DNS), 8 Blue peafowl (2 DNS), 6 Ostrich (5 DNS), 2 Black-necked swan (DNS) and 80 Koi.

New Acquisitions include: 1.0 Black jaguar, 1.1 Puma (red phase), 3 Brown pelicans, 1.2 Comb ducks, 8 Roseate spoonbills, 1.1 Hartlaubs touracos, 1.1 Redcrested touraco, 2.2 Amethyst starlings, and 1.1 Cape Shelduck.

## A SPECIAL BIRTH AT LAFAYETTE ZOOLOGICAL PARK.....*Bonnie Larson*

On 8 June 1982, a 12-18 lb. pup was born to our pair of California Sea Lions (*Zalophus californianus*). This is our female's first successful birth, the previous three being stillborn. The pup is healthy and nursing vigorously. We are excited and proud of the event and are hoping for many more.

## ST. LOUIS ZOO LISTS JUNE B & H.....*Gary A. Michael*

The following are the notable births and hatchings for the month of June 1982: 0.0.19 Maxmillian viper, 0.0.9 Indian blue peafowl, 0.0.1 Satyr tragopan, 0.0.15 Argentine cinnamon teal, 0.0.1 Chilean teal, 0.0.4 Red-crested pochard, 0.0.16 Hooded merganser, 0.0.6 Common shelduck, 0.0.5 Redhead, 0.0.25 North American ruddy duck, 0.0.1 Chiloe widgeon, 0.0.7 Patagonian crested duck, 0.0.1 Common goldeneye, 0.0.3 Black-bellied tree duck, 0.0.5 Chinese spotbill, 0.0.7 degu, 1.0 Lesser kudu, 1.0 Blesbok, 0.1 California sea lion, 1.0 Black lemur, and 0.0.1 Dusky leaf monkey.

## JULY B & H FROM SAN ANTONIO ANNOUNCED.....*Cindy Roger*

The San Antonio Zoo is pleased to announce the following births and hatchings for the month of July. The Bird department produced 1 Scarlet ibis, 6 American flamingo, 5 Moluccan radjah shelduck, 1 African yellow-bill duck, 1 Bahama pintail, 2 Ringed teal, 4 North American wood duck, 1 Wild muscovy, 20 Domestic muscovy, 1 King vulture, 1 Grey peacock pheasant, 2 Kenya crested guineafowl, 1 Black-breasted button quail, 2 Sarus crane, 4 Red and white crane, 2 Double-striped thick-knee, 1 Inca tern, 1 Diamond dove, 1 Crested quail dove, 2 Giant pitta, 2 Shama thrush, 1 Green-winged pytilia, 1 Gouldian finch, 4 Red-billed buffalo weaver, and 5 Rufous treepie.

The Reptile department produced 5 African ground gecko, 7 Dumeril's ground boa, 16 Albino corn snake, and 1 Baird's rat snake. The Aquarium produced numerous Dusky damsel and 30 African lyretail cichlid.

In Large Mammals, 1.2 Greater kudu, 1.0 Besia oryx, and 0.1 Springbok were born. The Small Mammal department produced 1.0 Three-banded armadillo and 1 White-handed gibbon.



# Coming Events

## 8th NATIONAL AAZK CONFERENCE

October 3-7, 1982                      Toronto, Canada

## THIRD ANNUAL ELEPHANT WORKSHOP

October 9-10, 1982                      Springfield, MO

## SECOND ANNUAL ZOO HORTICULTURE CONFERENCE

October 18,19 & 20, 1982              Wichita, KS

Hosted by Sedgwick County Zoo. For more information and tentative schedule, contact Virginia Wall, Horticulturist, Sedgwick County Zoo, 5555 Zoo Blvd., Wichita, KS 67212 (316) 942-2212.

## 5th ANNUAL CAPTIVE WILDLIFE SYMPOSIUM

October 29-31, 1982                      Louisville, KY

Theme for this year's Symposium will be "The Importance of Zookeeping in the Breeding and Reproduction of Exotic Species". Persons interested in presenting a paper should send an outline/abstract to Steve Taylor c/o Louisville Zoological Garden, 1100 Trevillian Way, Louisville KY 40213.

## 2nd DR. SCHOLL CONFERENCE ON THE NUTRITION OF CAPTIVE WILD ANIMALS

December 10-11, 1982                      Chicago, IL

To be held at the Lincoln Park Zoological Gardens. For further information contact Thomas Meehan, DVM, at the Zoological Gardens, 2200 N. Cannon Drive, Chicago, IL 60614.

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## Information Please

### REPTILE FECES REQUEST

I am compiling a diagnostic atlas of reptilian intestinal parasites and would appreciate any donated feces. I shall provide collecting vials to private collectors and institutions, and will submit a diagnostic report of my findings in return for the feces. There is no charge for this service. Please request your fecal collection vials from Sue Barnard, Senior Keeper, Dept. of Herpetology, Atlanta Zoological Park, 800 Cherokee Ave., SE, Atlanta, GA 30315.



By  
John E. Simmons  
Division of Herpetology  
Museum of Natural History  
University of Kansas, Lawrence, KS

In the region of the earth between the Tropic of Cancer and the Tropic of Capricorn, in areas of heavy rainfall, are majestic rainforests. Their lush green once covered a third of the earth's habitable surface, but 40% of that growth has been destroyed during the last 150 years. The remainder of this precious reserve is rapidly being eroded away through the actions of mankind, and unless immediate steps are taken we will soon face the grim reality of a habitat too badly damaged to save.

The Amazon ecosystem is an intricate, delicate balance of many diverse species, able to coexist in large part due to stable climatic factors (Simmon, 1979). After 60 million years of evolution, the Amazon Basin covers 6,000,000 km<sup>2</sup>, drained by a river system that carries 1/5 of all the river water on the earth through its 200 mile wide mouth. Biological production is so intense in the forest that nutrients are cycled through the vegetation via endotrophic mychorrhiza bacteria without entering the soil. These bacteria effectively connect the dead, decomposing litter to the living roots (Stark, 1969), but the result is nutrient-poor soil.

Tropical forest growth is lush (Table 1). An oak forest has an accumulation of some 6500kg/hectare of litter and 15,000 kg/hectare of humus (dead organic residue) per year, but tropical forest accumulates 25,000 kg/hectare of litter and only 2000 kg/hectare of humus over the same period of time (Kormondy, 1969). The difference in humus accumulation is another indication of how quickly nutrients are cycled back into the vegetation.

TABLE 1

A comparison of net primary productivity among selected biomes (data from Krebs, 1972).

<u>Vegetation Zone</u>	<u>Net Primary Productivity (dry g/m<sup>2</sup>/year)</u>
Arctic tundra	100
Desert	122-250
Agricultural land	650
Oak Forest	900
Mangrove	930
Savannah	1200
Tropical rainforest	3250

The one characteristic that clearly distinguishes the tropical rainforest from all other habitats is the diversity of plant and animal life. One study found 502 tree and shrub species in a 2000m<sup>2</sup> area of Brazil (Mathias, 1978). In all of the U.S. and Canada, there are only 121 species of mosquitos, but a small area of rainforest in Columbia was found to have over 150 species (Bates, 1960). In a study area in the upper Amazon region of Eucudor, 185 species of reptiles and amphibians were found to make up the herpetofauna of Santa Cecilia (Duellman, 1978), diversity unmatched

worldwide. Unfortunately, we are witnessing the destruction of this magnificent resource. The Santa Cecilia study site is already gone (Duellman, 1978), the forest cut away and replaced by small subsistence farms, which themselves will shortly be a choked tangle of second growth, supporting but a fraction of the diversity once there.

A long-held belief was that the Amazon would eventually prove to be the world's breadbasket. Surely the land that lay beneath all that thick and prosperous vegetation must be rich with promise. The last 50 years of attempts to introduce agriculture to the tropics have shown how deceptive the myth is. Tropical rainforests sit atop nutrient-poor laterite soils. Take away the forest with its 10 cm of interlaced roots with hyphal and rhizomorph tissue and soil, and the nutrients that give life to the plants go with it. The rain leeches and gulleys the soil severely, the intense sun burns down, and after a few crops it is unproductive. Cleared land will lose up to 45 tons per acre of soil under an 85 inch annual rainfall. To farm requires prohibitively expensive fertilizers to replace the nitrogen, phosphorus and other minerals and nutrients. The success of slash-and-burn farming, used for centuries, depended on small areas being cut, and allowed to return to the forest, a process that takes probably 150 years to complete (Richards, 1980). When the tropical forest is cleared away in large, expansive enterprises as is now happening world-wide, there is no wellspring for rebirth, the cycle is broken, the destruction complete.

Why is the forest being destroyed? There are two main types of exploitation which takes the greatest toll. The first is wood cutting. Commercially valuable hardwoods are taken first, followed by cutting of many other trees for the manufacture of plywood (Myers, 1982). The most severe of all the uses of wood is the clear-cutting of forests for wood pulp to make paper. Forests can be renewable resources, of course, but the difficulties faced in replanting a tropical rainforest are far beyond present technology. Even after approximately one billion dollars was poured into the Connecticut-sized Jari plantation in Brazil in an attempt to farm 250,000 of its 3.5 million acres (McIntyre, 1980), principally with just a few species of pulp trees, the project seems to be proving unsuccessful. One Jari will not destroy the Amazon, but it could lead to a host of imitators who will.

The gravest threat to the tropical forests now is clearing for agricultural use. From the time I first journeyed into the Amazon forest in Ecuador in 1971, I have seen the desperate settlers pouring in along the roads to cut away vast areas of forest on land parceled out to them by the government in 50-hectare plots. In Brazil, 3300 km of jungle highway has been opened by the government since 1970. The rate of colonization by small farmers has been far less than expected, but now large tracts of land are going to big ranches. As of 1980, 3.5 times as much land has gone to big ranches (to be clear-cut to make pasture) than to small farms (Smith, 1981).

What will the results of this destruction be? How will the rapidly accelerating loss of tropical forests effect us world-wide? Here are just a few thoughts to consider:

1) Loss of Diversity - As many as 40-50% of the earth's species exist in moist tropical forests (Myers, 1982), yet only 1 in 6 tropical species have been described. Which plants of great genetic potential are we losing, which plants of potentially high medicinal value? Many of the plants

## THE DESTRUCTION OF THE AMAZON JUNGLE: CAUSES AND CONSEQUENCES, *continued*

we depend on for food are hybrids, and if we destroy their wild forms, we destroy the genetic reserves necessary to keep them disease-free, efficient producers. Trees of unknown commercial value are being ground up into pulp to make throw-away paper.

2) Climatic Change - 50% of the rainfall in the Amazon is cycled directly through the forest. Loss of the forest could mean that rainfall would increase 5-25° north and south of the equator, and decrease 40-80° north and south of the equator. Without the forest to process it, CO<sub>2</sub> would build up, resulting in a massive greenhouse effect. We have already greatly increased the amount of CO<sub>2</sub> in the atmosphere from such activities as burning fossil fuels.

The national parks which have been established are not adequate to preserve a reasonable amount of tropical diversity, even if they can be adequately protected. Diversity can only exist when a large area is preserved (Lovejoy, 1982). National parks become isolated refuges, islands of a particular habitat, and it is the fate of island dwellers to become extinct (Carlquist, 1974).

So what actions can we take as individuals to try and stop the destruction of the tropical forests world-wide? Individual action may seem hopeless to turn the tide of destruction already in motion, but you must start with individuals to change the ways of human populations. Here are some suggestions:

1) Education - Take part in developing an awareness of what is happening in the tropics. Encourage your zoo to set education as a primary goal over just conservation of a few species. Zoos cannot preserve genetic diversity of the tropics, the forests themselves must be saved. Support conservation action groups.

2) World Hunger - Tropical agriculture will not stop world hunger, but as long as there are people without enough to eat, the forest will be cut down to try and feed them. Decreasing world hunger will help decrease pressures on tropical forests.

3) Recycle Products - Especially paper, to reduce the need for exploitation of natural reserves. For example, approximately 2500 million m<sup>2</sup> of wood are cut world-wide for use as fuel, in construction, and for paper pulp a year. The rate of usage of wood could increase to 6000 million m<sup>2</sup> by the year 2000 (Pringle, 1976).

4) Don't buy products made from wild animal fur, feathers, skin, hide, etc.

5) Cut down on use of fossil fuels.

About 15 million hectares of tropical forest are being cut and burned annually. This is an area approximately the size of Florida that is being lost each year (Richards, 1980). It is not yet too late to save some of the tropical forests of the world, but action must be taken soon, or we will all suffer the consequences of the loss of more green from the green planet.

## THE DESTRUCTION OF THE AMAZON JUNGLE, Continued

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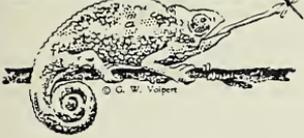
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## TROPICAL HABITAT EXHIBITS WORKSHOP



### FREERANGING MAMMALS IN TOPEKA'S TROPICAL RAIN FOREST

By  
Connie Cloak, Keeper  
Topeka Zoological Park

The Topeka Zoo's Tropical Rain Forest exhibit is a large geodesic structure planted with a variety of tropical vegetation. A number of enclosures within the exhibit contain confined animals, but the majority are free-ranging, including a couple dozen species of birds, several reptiles and, currently, five species of mammals. These include Cotton-headed tamarins, Giant Indian Fruit Bats, Two-toed sloths, Common Giant squirrels and acouchis.

Mammals tend to pose a number of problems in a natural habitat exhibit. Predation on birds and eggs is one concern, although this has been surprisingly rare in our experience. Cotton-headed tamarins have been observed eating small birds a couple of times. Empty eggshells with a single large hole in them have been found, probably the work of the squirrels. There may, of course, be other instances that go unnoticed, or more general disruption of breeding that is hard to document.

Damage to plants is a more constant and obvious problem. The sheer weight of a sloth or jumping squirrel is enough to break slender branches. Eating of plants severely limits the types we can grow to those which are too tough or unpalatable, or which can sustain damage and rapidly regrow. A new plant variety stands a good chance of being eaten to the ground overnight. Sloths, squirrels and acouchis all eat large volumes of plant matter, and the tamarins, while too small to do much significant damage, eat a lot of the flowers.

The most significant damage to plants is probably done by the squirrels' nest building. They break enormous quantities of branches for each nest, and periodically move on to build new nests. The ficus species, such as rubber trees and figs, are able to tolerate this fairly well and regrow rapidly. When they attack a slower-growing tree such as a Norfolk pine, they become more of a problem.

The feces of mammals is smellier and harder to clean after than that of birds. The exhibit is big enough to absorb virtually all the mammal feces without much odor or fly problem. For awhile, a bat roost developed a concentration of feces and became overly damp from being cleaned so much, but the bats have since dispersed more through the building.

Maintaining mammals may add to our pest problem, as quite large volumes of food have to be provided in locations accessible to mammals, including mice. Since some are nocturnal, food must be left overnight, which certainly encourages mice.

In general, the free-ranging lifestyles seem beneficial for the animals. The tamarins, for example, look healthier and have bred better than others the zoo maintains in smaller units. The bats reproduce very well in the building, and we have had second-generation births. The squirrels, which were nervous and in poor condition when confined to small units, are now sleek in appearance and more natural in their behavior.

Some basic problems with natural, free-ranging exhibits apply to mammals as well as birds. It is difficult to monitor animals as closely as in smaller, individual units, so that reproductive cycles, changes in behavior, and even illness or injury can go unnoticed. Controlling individual diet and collecting fecal samples is also difficult. Capturing an animal in the exhibit is often time-consuming and prove stressful for the animal.

Contact with the public may pose more of a problem for mammals than for birds, especially in the case of primates as human viruses may attack them. At least three tamarin deaths in the exhibit may have been due to viral diseases. "Naturalistic" hazards associated with a naturalistic exhibit include cuts from thorns, drowning, and predation; we have had a tamarin killed by a caiman, and a tamarin and an acouchi killed in the exhibit by an escaped margay. There are also a number of toxic plants in the building; as far as we know, no animal has ever been hurt by these, and it's interesting that tamarins have been seen eating nearly every type of flower in the building but never the toxic oleanders.

Achieving a working combination of mammals and plants has been a gradual process, and one that is never "finished." Essentially, the challenge has been to create a miniature ecology, enormously simpler than a natural ecology of course, but still quite complex. The ratio of animals to plants is very much higher than a natural ecology could support but is offset by addition of food and replacement of plants, and by removal of excess offspring and particularly destructive animals. The balance is maintained by manipulating these variables when we can, and finding ways to adapt to others. Some of the animals, such as sloths and squirrels, were introduced quite early in the exhibit's history, and proved too destructive to the small plantings. After the trees had had a chance to grow, the animals were returned and found to be tolerable. Others, such as the tamarins and acouchis, introduced themselves to free-ranging status by continually escaping from the confined area originally intended for them, until they- and we- had adapted to the new situation. In some cases a balance can't be reached, as with the red brocket deer which after over a year in the exhibit had destroyed so much of the ground cover that we had to take him out.

The free-ranging mammals have especially affected our management of plants. Each winter, we do a heavy pruning of the trees. This is important for the strength and attractive shape of the trees themselves, but it is also necessary to promote strong growth to support the animals' weight. As pruning time approaches, more and more of the long, thin branches which have grown over the summer are found broken. Pruning also allows more light to reach the ground, giving a boost to low-growing plants which suffer being eaten by acouchis as well as the larger ground birds.

The presence of free-ranging mammals adds a special dimension to the Tropical Rain Forest. The theme of the exhibit encompasses an entire habitat, including an impression of the diversity of life in the tropics. Thus, this is not just a planted aviary, as many visitors expect, but a more varied, and surprising, environment.



*“When it comes to prepared diets, keepers are more finicky than their animals.”*

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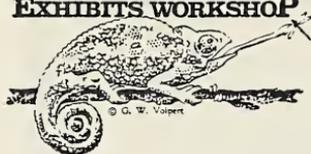
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By  
George G. Doering, D.V.M., M.S.  
Mark Morris Associates  
Topeka, Kansas

Cooperative nutritional research has been ongoing at the World Famous Topeka Zoo since 1966. Much knowledge has been gained and transmitted to the exotic captive animal profession. This information has been of benefit to captive and research animals world-wide. Nutrition in an enclosed tropical habitat has an advantage in Kansas because of controlled temperature, humidity and environment. The nutritional stresses of excessive heat or cold are not factors.

In this paper I will present some basic nutritional information and follow with nutrition of a few specific animal groups housed in Topeka's Tropical Rain Forest (TRF).

### I. Basic Nutritional Principles

A. All mammals and birds require six essential nutrients to be supplied daily for optimum performance. These nutrients include:

1. Water: The most important nutrient, up to 70% of the adult weight, and up to 95% of the weight of newborn animals. Water aids in palatability, digestion, circulation and excretion via urine, stool and sweat. Fresh clean water is an absolute requirement in a tropical habitat.
2. Protein: 22-26 nitrogen containing amino acids, an important part of all tissues, including muscle, tendons, bone, blood, milk, skin, hair, nails and hooves. Protein can also be used for energy.
3. Fat, lipids or ether extract: Necessary for energy, palatability, glossy haircoats. Essential fatty acids are the specific requirements.
4. Carbohydrates or nitrogen free extract (NFE): All break down to glycogen and glucose, used for energy by all cells. Cellulose is degraded in ruminants to assimilable acids.
5. Vitamins: Essential for numerous metabolic chemical reactions and transfer of energy. Seldom are they deficient.
6. Minerals or ash: 21-26 elements required for structure of bones, hemoglobin, hormones, and catalysts in enzymatic reactions. Supplementation may cause problems.

B. It is essential the nutrients be available in adequate but balanced ratios to each other. Excessive vitamin-mineral supplementation can be detrimental. The diet must contain enough energy so that poor eaters still receive a balanced diet. IT IS BETTER TO FEED A NEW BALANCED DIET THAN TRY TO BALANCE THE OLD, IMBALANCED DIET.

C. Daily record keeping of the diet fed, the amount fed, amount consumed, stool quality and amount, and general condition of the animal are essential for nutritional studies and ongoing information concerning the future well being of the animal.

D. Overfeeding or underfeeding. Rather than be offered a set amount of food each day, individual animals who eat less food and yet maintain their weight are offered less food. Animals who consistently consumed all of their ration were offered increasing amounts, provided excessive weight gain or diarrhea did not occur. Animals, including humans, are all individuals in their daily caloric requirements. It is not unusual for a 100% variation in the caloric requirement of two animals of nearly equal weight.

The detrimental effects of obesity are well documented. Obese captive animals do not live as long, have poor reproductive histories, and are poor surgical risks, cannot tolerate excessive hot weather, in addition to costing more to feed. In contrast, thin animals lack resistance to combat disease or parasitism, and do not adapt to extremely cold weather.

## II. Diets for Specific Animal Groups

A. Exotic Felidae - Prior to 1966 the World Famous Topeka Zoo was having difficulty reproducing exotic felines. Problems presented were infertility, or cubs which developed collapsed chests or pathologic limb fractures. Director Gary Clarke consulted with Dr. Mark L. Morris, Jr. about the diet fed the large cats. Horsemeat and road kills were the major food offerings to the cats at that time. The diagnosis of cubs which had died was classical secondary nutritional hyperparathyroidism.

This condition results when meat alone is fed to young growing animals. Rapid bone growth requires extra dietary calcium and phosphorus in contrast to maintenance requirements for adult cats.

Meats have a severely inverted calcium:phosphorus ratio. In order for the body to balance the absorbed phosphorus from the meat with calcium, the young cub's bones are demineralized as a source of calcium. The results of a prolonged dietary Ca:P imbalance (normal should be 1-2:1) are folding and metabolic fractures of leg bones and collapsed chests because of fractured ribs.

A balanced diet was developed by combining horsemeat, chicken, animal fat, grains, fiber, vitamins and minerals. Ground grains and fiber were added to approximate the vegetation consumed by eating intestinal contents of naturally killed mammals. The diet was canned and feeding trials conducted. The canned diet was well accepted, and the reproductive performance was fantastic. The diet was also developed in frozen blocks to decrease the labor costs of opening cans.

B. Primate Diet - Dry primate diets developed for research centers have been available for over 20 years. It has been documented that new world primates require vitamin D<sub>3</sub> in their diet. If only vitamin D<sub>2</sub> is supplied, secondary nutritional hyperparathyroidism will develop. This is very similar to the syndrome in felidae. Folding fractures, large fibrous jaws, loose teeth and death result. This condition was known as "cage paralysis" until pathologists documented the condition.

Smaller primates and prosimians did not do well on the dry or moistened primate biscuits. A completely balanced canned primate diet was developed from cereals, eggs, milk, sugar, vitamins and minerals. The moist canned form was very acceptable by the smaller primates. Improved reproduction and elimination of bone disease resulted from the use of this diet. Management improvements included less labor preparing diets

## NUTRITION IN AN ENCLOSED TROPICAL HABITAT, continued

of fruits, vegetables and supplements. The costs of procurement, preparation and storage of the natural diets were far in excess of the canned diet. Because vitamin C is required for primates and it is degraded by the canning process, it is essential that natural sources of Vitamin C (oranges) be offered daily.

Behavior modification procedures are practiced in many zoos. Large primates are given alfalfa hay, carrots, potatoes, bananas, oranges and other fruits and vegetables, in addition to their primate ration. Much time is consumed in eating the high protein roughage foods. In determining the makeup of some primate diets, it is found the vegetable or zoo salad consists of over 60% of the diet, and is deficient in protein and energy.

C. Marmoset Diet - Cooperative marmoset dietary research was performed by Theracon Laboratories, Topeka, KS and the Texas Dental School, Houston, TX. It was determined that marmosets and tamarins required four times the level of vitamin D<sub>3</sub> required by other new world primates. Therefore, the canned marmoset diet contains this excessive level of vitamin D<sub>3</sub> which is toxic for non-marmosets. At the World Famous Topeka Zoo, marmosets are fed inside an enclosure accessible only to them.

Marmosets are involved in research projects as animal models for colon cancer and dental problems. A palatable balanced canned ration simplifies the feeding of large colonies of marmosets and tamarins. As with other primates, a natural source of vitamin C (orange slices) are necessary.

D. Scarlet Ibis Ration - These beautiful reclusive birds are nutritionally classified as aquatic carnivores primarily eating fish, crustaceans, small amphibians and mammals. In essence, they require a diet similar to the analysis of a whole or entire rat or mouse. Thus, they are fed a Bird of Prey diet, upon which they thrived, but they were not as scarlet as they could be. It is known that ibises, flamingos and other red or pink birds are able to oxidize yellow or orange Beta carotene to red carotenoids. Beta carotene is a precursor of vitamin A. Thus, Beta-carotene in oil or Flamen oil (from carrots) was added to the Bird of Prey diet (during manufacturing). To supplement a prepared Bird of Prey diet (60% moisture) add 15 mg of Beta carotene per pound of food. Usually the carotene products are only a percentage of carotene and the rest oil. Vitamin A will not substitute. The reclusive ibises are fed at closing and eat during the evening and early morning.

E. Flamingo Ration - Flamingos do require a source of fresh water in the wild. They use the soda lakes just to filter their food. A soft-billed bird diet was developed at the W.F.T.Z., but is no longer marketed. Flamingos at Topeka are fed 50% thawed Bird of Prey and 50% Purina Trout Chow in water as a gruel.

One interesting environmental condition developed in Topeka's flamingos several years ago. Their feathers developed a damaged appearance because of the pecking and also the feathers developed a green-grey cast. Dr. Nuehring observed that the waterfall was operating 24 hours daily, with the flamingos always within its mist. Turning off the waterfall during the night solved another "so-called problem with the diet" because the birds' feathers had a chance to dry.

III. Future of Captive Exotic Animal Nutritional Research

Since 1966 numerous commercial captive animal diets have been developed and marketed for felidae, canidae, birds of prey, game birds, ratities, omnivores, reptiles and soft-billed birds. Because of the limited market and small sales volume, some of the diets are no longer commercially available. The future will likely see the use of more dry and/or water reconstituted products to save the severely inflated costs of shipping, freezing and canning. Frozen and canned diets contain water as a major ingredient. Water is an essential nutrient and aids the texture and palatability of a food. Water is a cheap ingredient but expensive when the cost of shipping the weight of water is added to the cost of the product.

The interest in nutrition that has developed at zoological parks in the United States and Canada in the past five years is enlightening. At least three zoos in the U.S. and Canada currently have fulltime nutritionists. Several other zoos utilize local nutritionists on a parttime basis, or have a consulting nutritionist available. These nutritionists are able to evaluate the nutritional value of certain specie's diets and make proper adjustments or recommendations. It is the goal of the nutritionist that a proper diet will maximize the growth, reproduction and life span of the specific species. It is our hope that our work will aid the health and longevity of numerous species, especially endangered ones. As inflation and space encroachment increase in the decades to come, nutritionists will have the task of developing balanced diets using ingredients that are available and reasonable in price. We envision our future as challenging and dynamic.

TABLE I  
CALCIUM:PHOSPHORUS RATIOS  
VARIOUS MEATS AND FELINE DIETS

Chicken necks, including bones	2:1
Whole Chicken	1.4:1
Chicken Meat, no bones	1:18
Hamburger and Chunk Beef, no bones	1:16
Horsemeat	1:30
Beef Heart	1:38
Beef Liver	1:44
Feline Diets	1.3-2:1

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# Chapter

Welcome!

To the Bronx Zoo Chapter and to the Santa Barbara Chapter and also the St. Louis Chapter. It's great to see you all getting into the swing of things! I look forward to hearing from you all periodically! Good luck with your chapters and projects!

## Santa Barbara Chapter

Newly elected officers of the Santa Barbara Chapter are:

President....Jeff Bergland  
Vice President....Fred Marian  
Secretary....Mike Jay  
Treasurer....Peter Grim

## Moorpark College AAZK Chapter

Newly elected officers of the Moorpark College AAZK Chapter are:

President....Robin Silverman  
Vice President.... Janet Meade  
Secretary....Nancy Childress  
P.R. Director....Glen Pederson

*By Patti Kuntzmann  
Coordinator for Chapter Affairs*

## San Antonio AAZK Chapter

The San Antonio Chapter of AAZK held its elections in April and the new officers are:

President.....Dave Whitney  
Vice President.....Gayle Katcher  
Sec/Treas.....Celia K. Falzone

# News

## Topeka Zoo AAZK Chapter

The Topeka AAZK Chapter is planning a "Keeper Raffle" this month. The proceeds from the raffle will go towards a new endangered species educational exhibit, funding for chapter programs and keeper exchanges. They recently held a swim party and potluck dinner to thank the Topeka Zoo Docents for their help in many of the Chapter's projects.

At their recent election, the following were selected as officers:

President.....John Brannian  
Vice President.....Charlotte Payne  
Secretary.....Kitty Shipman  
Treasurer.....Alice Miser



EXPERIENCES WITH FRUIT BATS  
AT THE KANSAS CITY ZOO

**TROPICAL HABITAT  
EXHIBITS WORKSHOP**



By

Dave Wetzel

Animal Technician, Kansas City Zoo

Fruit bats of the genus Pteropus belong to the family Pteropodidae in the suborder Megachiroptera. These crepuscular bats range from Madagascar, African islands near Zanzibar, islands in the Indian Ocean, Southeastern Asia, Indonesia, the Phillipine Islands, Marianas Islands, New Guinea, and eastern Australia to Fiji and Samoa.<sup>1</sup>

The genus Pteropus includes some 35 species with wingspreads ranging from 610mm (24 inches) to 1.7m (6 feet) and attain weights in excess of 900gr (11 pounds).<sup>2</sup> These bats are highly gregarious, often congregating in the hundreds at their diurnal roosts. These roosts are typically found in swamps, often close to large bodies of water.

In the evenings fruit bats fly to fruit trees where they chew the fruits to extract the juices. These bats seldom eat the pulp of the fruit, but may ingest portions of soft fruits. Flowers, leaves, and stems may also be chewed to extract their juices.

Daily Cycle

On 2 August 1981, 7.5 Asian Fruit Bats, Pteropus sp. arrived at the Kansas City zoo. These bats had recently been collected in Thailand and after a two-week stay in our Animal Health quarantine station, during which time they were weighed and measured for wingspan, they were transferred to a holding cage in the Tropical Habitat Building. (Weights were from 276.4g to 427.1g, averaging 340.6g. Wingspans measured 965mm to 1016mm, averaging 990.5mm.).

After four days in this cage, the bats were given the run of the building. The entire group took up residence in the tallest tree in the Habitat (approximately 25 feet tall).

Throughout the morning hours the bats are content to sleep or watch the keepers go about their morning duties. As the day progresses, the bats become increasingly active. They can now be observed grooming, squabbling amongst themselves, and in the past few weeks, mating. Individuals change places in the treetop several times throughout the day. As the afternoon wears on, the bats begin descending from their tree to the feeding stations below. The time of day varies, depending on the crowd size and the light intensity, but between 3:30 p.m. and 5:00 p.m., the bats come down to feed.

The bats descend to the feeding pans, grab a mouthful and either fly back up to the tree or scurry across the cage to hang behind it and chew their fruit. This feeding activity continues until full darkness sets in.

<sup>1</sup>Ernest P. Walker, Mammals of the World, Vol 1 (Baltimore: John Hopkin's University Press) p 200.

<sup>2</sup>Walker, p. 200

<sup>3</sup>Walker, p. 200

At least some of the bats seem to prefer to roost at night away from the other bats. Two to three bats will roost in a tree opposite the diurnal roost.

During this feeding time, the bats often take short circular flights from the feed pans to the roosting sites. Occasional flights to the other side of the building occur where individual bats often stop in trees.

During full dark the bats behave much the way they do throughout the day. Very seldom will a bat begin to fly, but their screeching calls can be heard as they bicker amongst themselves.

### Problems

As can be imagined the releasing of twelve mammals with an average weight of 340.6 grams can cause several problems. The following are the major problems we have encountered at the Kansas City Zoo.

#### 1) Feces

Due to their diet of fruit, these bats defecate often and profusely. This feces is in the form of a brown paste and forms oval droppings wherever it falls. The oval drops are fairly uniform in size, measuring approximately 3.5 centimeters by 2.0 centimeters. This fecal matter, when it dries, proves very difficult to remove. Indeed it adheres to surfaces and in some cases leaves a permanent impression.

A. Walls -- The walls in our building are of several different textures. Some are painted, others covered with a urethane insulating material, some are covered in rock and still others are bare concrete. One of our walls is painted with black spray paint, and when the feces falls on this wall and is subsequently removed, a broken oval outline remains where the fecal matter has apparently eaten portions of the paint away. A similar black wall painted with a gold paint does not seem to be affected by the feces. Regardless of what the wall is composed of, once the feces is dried, only scrubbing with warm water and a paint scraper can remove it. If it is fresh, a sponge and warm water is all that is needed.

B. Floors and railings -- Our floors and railings suffer the same fate as the walls. The bat feces dries within hours and it is necessary to take a wire brush or paint scraper to it in order to remove it.

C. Plants -- Our broad-leafed plants (figs, rubber trees, philodendron, dieffenbachia, banana) also get accumulations of feces. On these plants the feces is more significant in that it leaves burn marks if not removed quickly. Indeed some of the plants seem to burn within minutes of contact, others take hours and still others (palms) seem not to burn at all. Again the resulting scar on the leaf from the feces is in an oval shape.

D. Accumulations -- Underneath the roosting site an accumulation of feces develops quickly. This accumulation has resulted in the death of several small plants and the drawing of insects (ants, fruit flies, and roaches) to the area. Where a single bat or small group roost at night over a walkway, an almost solid accumulation occurs overnight.

E. Fungus -- The last problem with the feces has been the growth of a short-lived, and, as yet, unidentified fungal growth on the feces. This fungus occurs in less than 48 hours and dies off within 72 hours. It seems to grow only when temperatures are in the high 80's and the humidity

## EXPERIENCES WITH FRUIT BATS AT K.C. ZOO, Continued

is also high. Growth occurs equally well on walls, glass and plants. Although this fungus looks bad, it does not appear to be a hazard to other animals or people.

### 2. Physical Damage Due to Size

A second type of problem arises just by the size and the type of activity. When the bats come in to roost after a flight, they fly over the branch, grasp it with their feet, and practically fall to a halt. This causes great wear on the plant, especially palm fronds and soft plants such as bananas. The result is broken fronds, virtually stripped of leaves and banana leaves torn to shreds. Other woody plants suffer loss of leaves due to the somewhat violent landings and scramblings of the animals.

Another problem has just recently arisen in which the bats have begun eating a rubber tree. They take bites out of the leaves and chew them like fruit and spit out the indigestible pulp. This problem has only begun since we have been unable to supply the bats with grapes on a daily basis. When you add grapes, they stop chewing the plant.

### 3. Animal Problems

A) Amongst the group -- Although constant bickering over roosting sites and food occur, there have been no serious fights or injuries to the bats. Bickering occurs with a great deal of noise, baring of teeth and boxing with folded wings.

We have had one female bat that died apparently due to drowning in a shallow pool. This female may have been attacked by another bat as small drops of blood were found on the ramp, and then flown into the pool or she may have misjudged the distance while drinking and fallen in.

B) Other residents of the Tropical Habitat -- Again the bats get along well with other inhabitants of the Tropical Habitat. Only when a bird gets too close to an individual does that bat show any interest. Even then, the bat merely screams and moves away. Some birds get within six inches of the bats without problems. A crowned pigeon is nesting less than ten feet from the roost and a pair of Bali mynahs are building a nest in the rafters across from their tree. Pekin robins routinely hop about under the tree eating fruit flies and often rest in the tree with the bats. The Bali mynahs spend much time in the tree as do a pair of white-cheeked touracos and a red-bellied hornbill.

C) Temporary inhabitants of the Tropical Habitat -- This last problem has a tendency to be more urgent and must be handled more rapidly and delicately than any others. The problem is people, especially those overly afraid of the bats and those overly curious. Some people turn around and walk out as soon as they see the bats; others want to get closer than they should.

But regardless of the people's attitudes, fear or curiosity, the bats always cause a commotion when they spread their wings and effortlessly fly throughout the building

In summary, although we have had these bats for only a short time and they have caused us some husbandry problems, our overall opinion of them as a mixed-exhibit display animal is very favorable.



# Exhibit Options

## SMALL-SPACE EXHIBITS FOR BIRDS

By  
Paula Strasser, Senior Keeper/Birds  
Audubon Park Zoological Garden  
New Orleans, LA

### TROPICAL HABITAT EXHIBITS WORKSHOP



Much of the focus of tropical habitat exhibits in zoos has been on large, multi-species spaces. For birds, these generally take the form of large rooms or aviaries, suitably planted and temperature-and-humidity controlled. Many of the advantages and problems of such large space exhibits have already been covered in the course of this conference, and therefore we now turn our attention to the single-species or small-space exhibit. My remarks are primarily about birds, and specifically about the Audubon Zoo's Bird House, but the concepts are general enough to be applied to other types of animals and other institutions.

The difficulties of maintaining plants and animals together, of providing proper perching and nesting areas, and of parasite and disease control in small spaces are about the same as in large rainforest exhibits with one important difference, they are concentrated. Plants seem to wear out faster, fecal material seems ever-present, and the exhibits themselves need major refurbishing and renovation at more frequent intervals. Basically, because of the more cramped conditions, natural recycling cannot take place fast enough to offset damage caused by the birds, both direct damage from tearing plants and perches apart, and indirect damage, such as nitric acid buildup in the soil from fecal material. Providing secure nesting situations, away from public scrutiny is often difficult in small-space exhibits, and aesthetics often end up playing a larger role than many of us would wish. The scope of this paper is to demonstrate, using our Bird House as an example, exhibit design concepts that attempt to address these questions.

The Audubon Zoo's Bird House consists of seven small-space exhibits varying in size from 7 feet high by 5 feet wide by 9 feet long to 7' by 5' by 18'. They are arranged in a rough semicircle and surround our Tropical Rainforest exhibit which is roughly 30' in diameter and houses 53 birds of 19 species.

Our small-space exhibits are wire fronted, using a nut and bolt attachment that holds the wires under tension. We have found the wires to be extremely valuable in terms of ease of maintenance, bird safety and visitor enjoyment. The wires are spaced one-half inch apart, enough to keep all but the smallest tangers from escaping easily. Each exhibit has at least one drain in its concrete base, which is covered by six inches of gravel and six to eight inches of topsoil. Thus, if the need arises, we can completely empty and steam-clean the cage. Lighting is provided by double fluorescent fixtures which contain one Gro-light and one white light tube apiece. We are in the process of changing over to Vitalites, which provide more of the sun's spectrum than regular fluorescents or Gro-lights, and our toucan exhibits have these instead of white light tubes.

Once you have your basic box, it is time to think about filling it. Most of us, as keepers, have little or nothing to say about the first step in exhibit design, that is, deciding what sort of permanent fixtures go in. This is generally decided upon by architects and curators. Permanent fixtures include the rockwork, ponds, streams and concrete trees that determine once and forever the character of the exhibit. These things are in

## SMALL-SPACE EXHIBITS FOR BIRDS, *continued*

there for good, and the best we can do is work around them and hope the streams drain properly and the pipes don't clog.

After the permanents are in, the removeables can be planned. There are several classes of removeables, first of which is cage furniture. These items are too big to move in and out with ease--we generally remove wires to get large branches and logs in. Now is when you start tailoring the exhibit to the bird. Large branches for large birds, and small branches for small birds is the general rule, but it is a good idea to include perches of many different sizes for two reasons. First, the different sizes provide exercise for the birds' feet, thereby helping to reduce the problems brought on by poor blood circulation to the feet. Second, you never know when the occupants of an exhibit are to be changed, and if suitable perches are already installed, there's one less thing to worry about when the changes occur. Our perches come from around the park, trimmings left over from tree surgery. We always use natural perches; the rough bark stimulates the bird's feet; the branches are much cheaper than synthetics or dowels; they are much easier to keep clean; and they look better. We try to place perches with an eye to having them look "right" even if there are no plants around. Perch planning must take into consideration the use of the entire space; you can't depend entirely on your green plants to do the job for you, and if the perches themselves are interesting structures there is still something to look at, from the public's point of view, even if you have lost some of your green plants. The birds do not really seem to care about the exact perch placement, as long as they have ample room to jump and fly about, whereas a slight rotation of a branch can make all the difference in terms of aesthetics.

Other items than can be considered furniture are large logs and the various devices used as camouflage for food and water dishes.

Planting in small-space exhibits is often a hit-or-miss proposition with many trials and errors before a suitable planting scheme is adopted. The major problem a small-space exhibit has to contend with is destruction of the plants by the birds. Psitticines are undoubtedly the worst culprits as far as plant destruction goes. One way to lessen the destruction is to be sure that they have greens in their diet or to provide them with browse such as cut bamboo. This helps, but does not stop them from eating the plant that you just put in yesterday; it may be that the best psitticine exhibits have few or no plants, but lots of interesting rockwork and perches. On the other hand, nothing seems to stop jays from pulling leaves off trees or digging up small plants. With them, it seems to be a matter of trial and error before spiny enough or sticky enough plants are found to dissuade them from pulling leaves. We have had some success with rubber trees in our Plush-crested jay exhibit; the latex in the plants seems to deter the birds, and the trees have been in their exhibit for about six weeks now with not a leaf pulled off.

Semi-permanent plants are those large trees and ground plants that provide basic cover and additional perching space. These are the plants that can last while being chewed on, over watered, over fertilized and improperly lighted. These plants are not changed often, and we have had the best success with various types of palms, Ficus trees of various species and cucurlligo, or palm grass.

Ephemeral plants don't last. We don't expect them to, and they are the window dressing that completes the exhibit design. These include flowers, grasses, cacti that must be removed, in our case, every six weeks or so

due to too much water, and other small plants. We are fortunate in having as part of Audubon Park a greenhouse which supplies most of our plants, and our horticulturist, Paul Keith, takes an active role in dressing up the Bird House.

Most of the plantings of ephemerals, and, to some extent, the semi-permanent plants, is done for the enjoyment of the visiting public. I am convinced that, in general, the people who come to our institutions do not require absolute authenticity in our rainforest exhibits. They do, however, seem to require lushness in planting. Because of this, we can take advantage of annuals, local scrubs and saplings, and even sprouted finch seed and pigeon grain to cover the ground and create the proper atmosphere.

Integral to a successful exhibit is planning for breeding activity. Various permanent and semi-permanent nest structures are used at Audubon, including hollowed-out palm logs for toucans, wire nests made from hanging baskets for jays, the standard-issue waterfowl nest boxes, or even just a pile of sticks left in the exhibit so the birds can build their own.

Taken as a whole, the various aspects of small-space exhibits--the permanent fixtures, furniture, semi-permanent and ephemeral plants and nesting structures--combine to provide exhibits that are safe and secure for their occupants, functional for the keeper, and aesthetically pleasing for the visiting public.

## Book Review



### Lovebirds and Their Colour Mutations

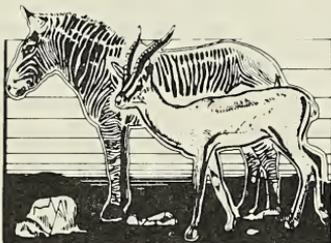
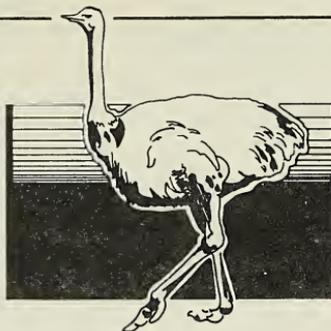
By Jim Hayward, 1979, 108 pgs.  
Color and black and white photographs  
and illustrations. Publishing by  
Blandsford Press Ltd., U.K., Distributed  
by Sterling Press, N.Y., N.Y.

*Review by Jim Rybicki  
Cleveland Metroparks Zoo*

A book aimed more at the hobbyist than the professional, Lovebirds and Their Colour Mutations is a helpful collection of housing and feeding hints, breeding suggestions and health information for each of the nine species of lovebirds. There is also a heavy emphasis on genetics and the many breeding combinations available when you include the various color mutations inherent in each species. Although survival of the species is our main goal as breeders, and color variance plays a minor, if not non-existent role, the information on linebreeding and inbreeding does aid in understanding the science of genetics.

The chapters most helpful to zoo personnel are those dealing with health and breeding problems. The author includes those problems and solutions usually found in books on aviculture, along with an interesting and impressive section on identifying causes of death. There is a list of things to look for through external examination, plus a step-by-step approach to necropsy that is very informative. I would recommend this book on the basis of these two chapters alone.

Lovebirds and Their Colour Mutations carries a \$14.95 price tag in the States, due in large part to the fine quality paper and excellent color photos. It is published by Blandsford Press Ltd., Link House, West Street, Poole, Dorset BH15 1LL U.K. and is distributed in the U.S. by Sterling Press, 2 Park Avenue, New York, N.Y. 10016.



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# Education Alternatives...

## EDUCATIONAL OPTIONS IN A TROPICAL HABITAT

By  
Ron Kaufman  
Education Coordinator  
Topeka Zoological Park

Providing an educational experience using a tropical habitat can be one of the most challenging, yet frustrating tasks for a zoo. There are problems of labelling the variety of free-ranging animals, selecting topics and artifacts for graphics, coping with the environment and trying to hold visitor attention in super-stimulating surroundings.

Careful planning and heroic sacrifice can be used to help structure any zoo educator endeavor. It is no different for a tropical habitat. Careful planning is important to develop a cohesive, structured program. Heroic sacrifice is important because zoo folks like to say more than visitors are willing or able to handle. Thus, we must learn to edit our presentations.

Planning involves the establishment of goals and objectives, determination of resources, audience awareness and the task of figuring out what to say and how to say it. That doesn't sound too difficult, does it?

First, establish goals and objectives. Do this for the institution, and for the tropical habitat.

Every zoo should have goals and objectives. Often, they're based on the functions of a zoo. They provide the means for a logical development of the zoo's facilities, staff, collection and programs. So, the zoo should have educational goals and objectives. Simple statements are sufficient, as they are guidelines, not detailed plans. Goals are long-range, nearly unattainable beasts; objectives are short-range, attainable ways to reach a goal. It's possible that a tropical habitat is one objective of your zoo's education goal.

Each major exhibit or exhibit complex should have goals and objectives. After all, there must be reasons for building something as complex as a tropical habitat! Often, the goals will be educational in nature; the objectives could generally lay the groundwork for an education program using the exhibit's facilities, collection and staff.

Goals and objectives may become too far-fetched to be useful. So, temper them with a survey of the resources that are available or will become available. In zoo business, that will bring anyone's head out of the clouds!

Begin with the entire zoo. How much time can it commit to education on the tropical habitat, compared to other areas? How much money is there to do it with? Will it take special facilities and/or equipment to execute the educator's plans? And, what about people? Will it take more staff, volunteers or contractual workers? Where does the habitat lie in the list of priorities?

Then, look at the exhibit. What are its resources? How much space is available, on the walkways, off the walkways, in side areas, off exhibit, etc.? What are the physical factors, such as temperature, humidity, sun-

## Educational Options in a Tropical Habitat, continued

light and traffic patterns? What about the staff? Will they have time to help in an educational endeavor? What are the exhibit's assets and liabilities? Assets can be used to advantage, such as well placed benches and ventilation. Liabilities (and there's bound to be a few!) can be downplayed or at least made harmless. Sometimes they can become assets.

One of the factors often overlooked is audience awareness. It's important that the zoo staff be aware of its visitor demographics. Once they're in the zoo, or at the exhibit, watch them and listen to them. See what holds their interest and where they spend their time; both in touring and resting. What labels do they read; which graphics? Listen to their comments. Ask your staff and volunteers what questions they most often receive and what they see in visitor behaviors and reactions. Ask, and then listen to the answers! A good knowledge of what most interests the visitor will go a long way in determining an educational approach to the habitat.

Determining what to say and how to accomplish it is the next hurdle. Careful planning up to this point will help immeasurably. Then comes heroic sacrifice. There is a tremendous amount of education that could be done about tropical areas. It is a complex environment, with a myriad of animals and plants. It is being assaulted by primitive and civilized development on all fronts. Your exhibit undoubtedly contains equally complex animals and plants. You'll probably find everything fascinating in the habitat, but the visitor cannot comprehend all of it in the average visit. Determine the minimum bits of information, attitudes and concepts that you'd like the visitor to gain. Base the education program on those points and carefully build it with them in mind. Remember what you learned about your audiences; you're educating them, not the zoo staff.

Deciding on the methods to use for educating is the final step before implementation. Help is available in the variety of AAZPA and AAZK publications and committee reports.

Use your resource survey to guide you in your endeavors. Each zoo has its limits, and its own needs. Make use of the generally successful programs that many zoos have, but only if you can do them well.

Most zoos have at least labels, and a few graphics. They are the first-line of the educational offense used in zoos, so they should be carefully written and produced. They may be the only educational program that the majority of casual visitors experience.

There are many other options available. There are guided tours, conducted by Docents or Staff; self-guided tours, using booklets or audio devices; audio-visual presentations; question and answer stations; discovery rooms; touch and feel stations; talks with the Keeper; organized classes; supplements for classroom use and demonstrations. All of the above are proven devices (under the proper circumstances) but do not let the message get lost in the medium!

Finally, once the material is written and before it goes into production, examine it. Edit it. Get tough with it. Be critical of everything from the information to sentence structure, to layout ideas. This is your last chance for heroic sacrifice.

Careful planning and attention to resources and the audience can result in a good, solid educational endeavor for the tropical habitat. Researching the various options and freely engaging in heroic sacrifice will make it effective. Just remember that you can't teach everything there is to know about tropical habitats to the casual zoo visitor. You must be selective.



# Legislative News

*Compiled by Kevin Conway*

## ENDANGERED SPECIES ACT REAUTHORIZATION BILLS PASS HOUSE AND SENATE

H.R. 6133, a three-year reauthorization of the Endangered Species Act, passed the House of Representatives on 8 June under the Suspension Calendar. This legislative tool limits floor debate on a bill to 40 minutes, allows no amendments and requires a 2/3 vote of approval by voice vote.

On 9 June, the Senate also passed a three-year reauthorization, S. 2309. The bill was brought to the floor under a unanimous consent agreement, thus debate on amendments was limited to an hour, and debate on the final passage of the bill restricted to four hours. S. 2309, with two amendments, passed on a voice vote.

The first amendment addresses noncommercial transshipments through the U.S.: such shipments are not to be seized if they were lawfully exported from their country of origin and may be lawfully imported into the country of destination. To prevent the U.S. from becoming a free port for endangered species, the amendment specifies that importation into the U.S. must be accidental.

The second amendment gives the states a stronger voice in the endangered species process. In cases involving regulations proposed by the Secretary of Interior or of Commerce, when there is disagreement from a state with jurisdiction over the disputed species' habitat, the Secretary would be required to give reasons for overruling the states' position.

Because H.R. 6133 and S. 2309 are not identical bills, a conference must now be held. Although differences in the bills must be reconciled, no further opposition is expected.

Both bills strengthen the Act while streamlining administrative procedures. Both strengthen the listing process by (1) placing time limits on the listing and (2) by removing economic considerations from the listing process. Listing species will be based solely on the best scientific and commercial data available. Economic analysis will be required in designating critical habitat but will not delay the listing process.

AAZPA and many environmental groups formed the Endangered Species Act Reauthorization Coordinating Committee, combining efforts to ensure passage of the bill. We are pleased with the results. Both Senators and Congressmen have praised the Committee for its contribution to this balanced piece of legislation.

AAZPA members also contributed toward reauthorization of the Endangered Species Act. You supported the Act by sponsoring Endangered Species Weeks, holding endangered species discussions, or writing your Congressmen and Senators. Thank you for all your help!

*---K. Vehrs in AAZPA Newsletter*

## USFWS PROPOSES REGULATIONS ON MINNESOTA GRAY WOLF

The U.S. Fish and Wildlife Service proposes to amend the regulations under which the gray wolf in Minnesota is conserved. The amendment, which would have the effect of returning a great measure of wolf manage-

## LEGISLATIVE NEWS, Continued

ment to the Minnesota Department of Natural Resources, would authorize the State of Minnesota to permit a sport harvest on Gray wolves, and would permit the sale in interstate and international commerce of wolves and wolf pelts taken in that harvest, provided that the State's tagging requirements were observed and the provisions of the Convention on International Trade in Endangered and Threatened Species (CITES) were met. The harvest would take place primarily in areas where wolves have repeatedly preyed on livestock, and would be limited by the wolf density figures established in the Fish and Wildlife Service's Eastern Timber Wolf Recovery Plan. Comment from the public on this proposed rule must be received by 13 September, 1982 to be assured consideration.

---Federal Register, 14 July 1982

### REVISION OF SPECIAL RULE FOR THE AFRICAN ELEPHANT

The U.S. Fish and Wildlife Service revises the special rule for the African elephant (*Loxodonta africana*), by requiring that raw ivory imported into or exported from the United States be marked, by eliminating prohibition against certain domestic activities and by limiting coverage of the special ivory rule. This rule makes no changes in the regulations implementing the CITES (50CFR Part 23). The special rule recognizes the difficulty of enforcing some of the requirements of the old special rule and is designed to bring the special rule into line with the provisions and recommendations of the Convention. The intended effect of this rule is to preserve scarce resources and provide more effective controls on the international trade in African elephant ivory. This rule is effective on 20 September 1982.

---Federal Register, 20 July 1982

### U.S. POPULATION OF OCELOTS ADDED TO ENDANGERED SPECIES LIST

Due to an inadvertent oversight, the U.S. population of ocelot (*Felis pardalis*) a species which occurs in extreme southeastern Texas, and which may wander into Arizona from Mexico, is not officially listed as an Endangered Species, although all populations which occur in foreign countries are listed. This is because of the special circumstances that this species was listed pursuant to the 1969 Endangered Species Conservation Act, which had separate procedures and separate lists for foreign and domestic species. When the current 1973 Endangered Species Act repealed the 1969 Act, this species was carried forward onto the 1973 combined list but without completing the procedures for listing species which occur within the U.S.

On 25 July 1980, a proposed rulemaking was published to list the U.S. population of the ocelot, and which sought to correct the oversight which resulted in its inadvertent exclusion when the foreign populations were listed. At that time, the Governors of Texas and Arizona were notified of the proposed action, and asked to submit any data, comments, or opinions they might have. All data received as a result of the proposal have now been analyzed, and the Service is hereby adding the U.S. population of the Ocelot to the List of Endangered Fish and Wildlife. No Critical Habitat is determined in this rulemaking on the ocelot because such a designation would not be in the best interests of conservation of the species. This rulemaking became effective on 20 August 1982.

---Federal Register, 21 July 1982



# Tooth Talk

By

EDWARD V. SHAGAM, D.D.S., P.A.  
ZOOLOGICAL DENTAL CONSULTANT  
127 HIGH STREET  
MOUNT HOLLY, NEW JERSEY 08060

## Dentistry for Animals? - Yes!

The role of dentistry in veterinary zoo medicine is becoming more important every day. No - we're not talking about cavities for the most part, but we should be thinking about chewing problems due to injured teeth, "first" teeth that don't "fall out" properly, and problems that can develop around the gum tissue that covers the bone which in turn supports the teeth. After all, the animals that professional keepers are responsible for are often endangered species, and, as a practicing dentist for humans as well as a zoological dental consultant, I've found that many species are now on a zoo diet that is sometimes significantly different from what they found in their natural habitat regarding "nature's tooth-paste" - hard and/or abrasive foods. By chewing, nature in the wild has provided for tooth care by using lips and cheeks as muscles that move abrasive food substances against the teeth.

## Why be so concerned about teeth?

Most animals depend on their teeth not just for making food digestible but for defense, social structure position, appearance (loss of teeth causes the lips and cheeks to make the face appear sunken) and often for holding objects. So we've got a responsibility to make sure your animals have good oral health. An infected, or abscessed tooth can lead to a spread of infection that could give the animal problems with chewing, taste, smell and defense, and could even spread the infection through the animal's entire system.

## How do professional animal keepers fit in with the picture of good animal oral health?

You could be one of the most important aspects! Because keepers know their animals so well, any change in eating habits, excess drooling, buildup of debris on teeth, discoloration of teeth, failure to eat, eating on only one side of the mouth, or swelling should be reported to your resident veterinarian at once. If needed, a zoological dental consultant like myself can be called to assist your vet in alleviating dental problems. Animal dentistry can do almost anything human dentistry can, from root canals (dental nerve) treatments, to fillings, extractions and even caps! But the trick is to catch the problem early - so you're a very important part of the treatment. Early diagnosis means early treatment of the problem and could even save the life of an animal with serious dental infection.

I've arranged with your editor to answer any animal dental questions you may have in up-coming issues of Animal Keepers' Forum, so please don't hesitate to write me and ask - it could be a question very important to the dental well-being of your animals. And please don't be afraid of questions that might sound "silly" - if you care enough to think of your question - as a professional keeper, that question is important.



# Conference..... 82



## OFFICIAL AAZK CONFERENCE LOGO

The lynx is the official logo of the Metro Toronto Zoo Chapter of AAZK, and was drawn for the chapter by Paul Harpley, wildlife artist and member of the Zoo's Graphics Department.

**A.A.Z.K.**

## 1982 AAZK NATIONAL CONFERENCE SCHEDULED PAPERS

**NATIONAL CONFERENCE**

**OCT. 3-7 1982**

**CHELSEA INN, TORONTO, CANADA**

1. "Captive Reproduction of the Scheltopusik at the Metro Toronto Zoo"  
Oliver Claffey, Metro Toronto Zoo
2. "The First Successful Birth of a Lowland Gorilla at the Philadelphia Zoo"  
Patti Kuntzmann, Philadelphia Zoo
3. "Woodland Park Zoological Garden's Gorilla Exhibit"  
Wayne Buchanan, Woodland Park Zoological Garden
4. "Exhibit Design in Climate Extremes (at Washington Park Zoo)"  
Jan McCoy, Washington Park Zoo
5. "Dominance & Social Dynamics of a Group of Captive Capybara"  
Frank Kohn, Audubon Park Zoological Gardens
6. "Giraffe Squeeze Cage Procedure for Hooftrimming at Woodland Park Zoo"  
Wendy Wienker, Woodland Park Zoological Gardens
7. "Grooming Behavior in a Captive Troop of Hamadryas Baboons"  
Anthony Vecchio, Riverbanks Zoo
8. "Training Through Staff Exchange Programs"  
Elandra Aum, Woodland Park Zoological Gardens
9. "Elephant Management at Woodland Park Zoological Gardens"  
Ellen Leach, Woodland Park Zoological Gardens
10. "Hand-Rearing of Precocial Birds at the Bronx Zoo"  
Regina Keenan, Bronx Zoo
11. "Management of Felids at Howletts Zoo Park"  
Douglas Richardson, Howletts Zoo Park
12. "Renovation of a 50-year-old Big Cat Exhibit"  
Mary Swanson, Fresno Zoo
13. "Successful Breeding of Golden Eagles at the Abilene Zoo and Reestablishing of a Wild Population in the Eastern United States"  
Bill Hunt, Abilene Zoological Gardens
14. "Woodland Park Zoological Garden's Eagle Release Program"  
Wayne Buchanan, Woodland Park Zoological Gardens
15. "Rio Grande Herpetarium/Environment Modification in High Desert"  
Dora Jacobs, Rio Grande Zoo
16. "Readapting a Tropical Species to the Tropics (Goeldi Monkey)"  
Sally Lieb, Dreher Park Zoo
17. "Herpiculture and the Use of a Naturalistic Exhibit"  
Thomas Huff, Reptile Breeding Foundation, Picton, Ontario
18. "Bird Management in Mixed Species Exhibits (Mammals & Birds)"  
Peter Shannon, Audubon Park Zoo
19. "Notes on Arctic Hare Husbandry"  
Kevin Moore, Salmonier Nature Park

CONFERENCE '82, Continued

20. "A Question of Priorities (are Zoos Endangered?)  
Neville Pike, Metro Toronto Zoo
21. "Weatherization of the African Savanna Aviary"  
Debbera Stecher, Woodland Park Zoological Gardens
22. "Muck Music"  
Chris Rasums, Little Rock Zoo
23. "Talking Zookeeper Blues"  
Oliver Claffey, Metro Toronto Zoo

CONFERENCE NOTES AND REMINDERS

---Conference registration forms and forms for hotel reservations may be found in the April, May, June, July and August issues of AKF. Make checks payable to "Metro Toronto AAZK Chapter". Hope to see you there!

---Keepers are reminded that items are still needed for the auction. Any type of animal-related article is suitable and proceeds from the auction will help offset conference expenses. REMEMBER, if you are crossing into Canada from the USA or another country, there are regulations concerning transporting items made from parts of certain animal species.

AGENDA FOR 8TH NATIONAL AAZK CONFERENCE

*Hosted by the Metro Toronto Zoo Chapter  
at the Chelsea Inn, 33 Gerrard St. W.  
Toronto, Ontario, Canada*

Sunday, October 3rd

- 9 a.m.-5 p.m. Board Meetings (members invited to attend sessions)
- 4 p.m.-7 p.m. Registration
- 7 p.m.-10 p.m. Icebreaker (held at Chelsea Inn)

Monday, October 4th

- 9 a.m.-11 a.m. Welcome and introduction
- 11 a.m.-4 p.m. Metro Toronto Zoo - lunch provided  
Tours and Discussion Groups
- Dinner on your own
- 7 p.m.-9 p.m. Women in Zoos - Workshop
- 9 p.m.-11 p.m. Keeper Safety - Workshop

Tuesday, October 5th

- 9 a.m.-Noon Papers
- Noon-2 p.m. Lunch provided at Hotel
- 2 p.m.-5 p.m. Papers
- Dinner on your own
- 7 p.m.-8:30p.m. Keeper Education - Workshop
- 9 p.m.-11 p.m. Keeper Research - Workshop

Wednesday, October 6th

- 9 a.m.-Noon Papers
- Noon-5 p.m. Metro Toronto Zoo -lunch on your own  
Tours and Discussion Groups
- 7 p.m. Dinner on the Town - provided
- Keeper Education Committee Meeting (following dinner)

## CONFERENCE '82, *Continued*

### Thursday, October 7th

9 a.m.-Noon      Papers  
Noon-2 p.m.      Lunch provided at Hotel  
2 p.m.-5 p.m.    General Membership Meeting  
7 p.m.-Midnight  Banquet and Auction

### Friday, October 8th

Bus/Tour with lunch, Peterborough Zoo  
Car/Small group tour, Reptile Breeding Foundation, Picton

### Zoo Tours and Discussion Groups

Tours of the Animal Health Unit and Commissary (nutrition)  
Discussion groups: Zoo Horticulture, Camel Training, Fish, Reptiles/  
Amphibians, Birds, Herbivores, Carnivores and Elephants.

## *from the President*



Dear Fellow AAZK Members,

The Toronto National AAZK Conference is fast approaching, and I would like to remind each of you that your presence and participation in the board meetings, on Sunday, October 3 from 9 a.m. to 5 p.m., is welcomed and encouraged. AAZK has always been an association that is dependent on the input of each member to keep it strong and responsive. Many projects of importance to us all are continuing to improve the professional quality of our animal care, and being initiated to meet our growing need to improve captive animal care, and to promote zookeeping as a profession. Please use the following schedule to guide you in your choice of topics you would like to discuss with the board and other members. The list of topics may grow with member input, and some changes may be made, so, once you reach the conference, check for an updated schedule. See you all soon.

Sincerely,

*Patricia E. Sammarco*  
*President*

### PROPOSED SCHEDULE FOR THE 1982 BOARD MEETINGS

9 a.m. Toronto Conference Hosts Keeper Accomodations List Philadelphia Conference Hosts Bids for 1982 Conference Site Awards Committee	1 p.m. Regional Coordinator System <u>Animal Keepers' Forum</u> Gestation Notebook Infant Development Notebook Diet Notebook
10 a.m. Research Grants Committee Animal Data Transfer Forms Logo Decals Logo Patches and Pins Logo T-shirts	2 p.m. Membership Directory Book Reviews Membership Brochures Career Brochures Education Committee Film Project
11 a.m. Keepers Care Buttons National Headquarters Coordinator for Chapter Affairs Coordinator for International Affairs Nominations/elections Committee	3 p.m. Program Library Library Resources Keeper Exchange History Committee Keeper Data Professional Standards Committee
4 p.m. Legislative Action Committee Board Assignments Review Constitution and Incorporation Papers	



We are indebted to the AAZPA Newsletter for allowing us to reprint portions of this section from their "Positions Available" listing. This is a monthly service to us, for you.

CHILDREN'S ZOO/NURSERY SUPERVISOR...responsible to curator for collection, husbandry and area personnel management. Must have strong background in mammals and exotic infant care, plus supervisory experience, plus supervisory experience. Salary \$15,345-\$16,272, plus benefits. Send resume by 1 October, 1982 to Ralph Harris, Oklahoma City Zoo, 2102 NE 50th St., Oklahoma City, OK 73111. (405)424-3344.

GENERAL CURATOR...requires supervisory skills, experience in captive management of zoo animals and a minimum of a Bachelor's Degree in Zoology or related field. Salary \$14,300-\$15,204. Mail resume and references to Carolyn S. McClintock, Mesker Park Zoo, Bement Ave., Evansville, IN 47712. (812) 426-5610.

CURATOR OF ANIMALS...responsible for operation of native wild-life exhibit, including exhibits for mammals, aviary, new Children's Farm, indoor nature center, public programs and supervision of keepers. Requires B.S. in biology or related field and three years' experience. Salary \$10,650-\$12,000. Send resume and three letters of recommendation to: Alfred D. Bjelland, Exec. Dir., Maymont Foundation, 1700 Hampton Street, Richmond, VA 23220. (804) 358-7166. EOE.

The following "Positions Available" were sent directly to the editorial offices of Animal Keepers' Forum for inclusion in this section.

ZOO INTERNSHIP...Big Cypress Nature Center is offering an internship for January 1983 with their Animal Rehabilitation Center (project A.R.C.). Project A.R.C. is a community program where injured wildlife are treated and released back to nature after rehabilitation. Duties involve general care, feeding and treating injured animals. Also - rehabilitation work and educational programming included. Intern will receive \$55.00 per week stipend and housing. Interested applicants should send resume and two references to Big Cypress Nature Center, 1450 Merrihue Drive, Naples, FL 33942, c/o/ Amy Lawson, no later than 15 October 1982. Internship lasts 10 weeks - longer preferred.

CHILDREN'S ZOO MANAGER...Responsible for management of Children's Zoo division of Audubon Zoological Garden. Responsible for supervision of 6 full-time personnel and additional volunteer staff. Must work in cooperation with Education department. Should have good animal knowledge and strong organizational skills. Require bachelor's degree and minimum of 2 years' supervisory experience in a recognized zoo or animal research facility. Prefer, in addition, some education training. Starting salary \$1325/mo. plus excellent fringe benefits. Send resume and application to Dale Stastny, Deputy Director, Audubon Zoological Garden, P.O. Box 4327, New Orleans, LA 70178. Interviews will be held at the Phoenix Conference; if desired, please contact Mr. Stastny to set up time in advance.

SALES DIRECTOR...Individual needed for supervising and coordinating production and sales of exotic animal diets. Must have background in zoo animal nutrition, and be able to communicate on a professional level with zoo directors, veterinarians and curators. Salary commensurate with ability and experience. Send resume to International Foods Co., Inc., P.O. Box 29345, Lincoln, NE 68529.

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#### INFORMATION FOR CONTRIBUTORS



*Animal Keepers' Forum* publishes original papers and news items of interest to the Animal Keeping profession. Non-members are welcome to submit articles.

Articles should be typed or hand-printed. All illustrations, graphs and tables should be clearly marked, in final form, and should fit in a page size of no more than 6" x 10" (15 cm x 25½ cm.). Literature used should be cited in the text and in final bibliography. Avoid footnotes. Include scientific names.

Articles sent to *Animal Keepers' Forum* will be reviewed for publication. No commitment is made to the author, but an effort will be made to publish articles as soon as possible. Those longer than three pages may be separated into monthly installments at the discretion of the editorial staff. The editors reserve the right to edit material without consultation unless approval is requested in writing by the author. Materials submitted will not be returned unless accompanied by a stamped, self-addressed envelope.

Telephoned contributions on late-breaking news or last minute insertions are accepted. However, phone-in contributions of long articles will not be accepted. The phone number is (913) 272-5821.

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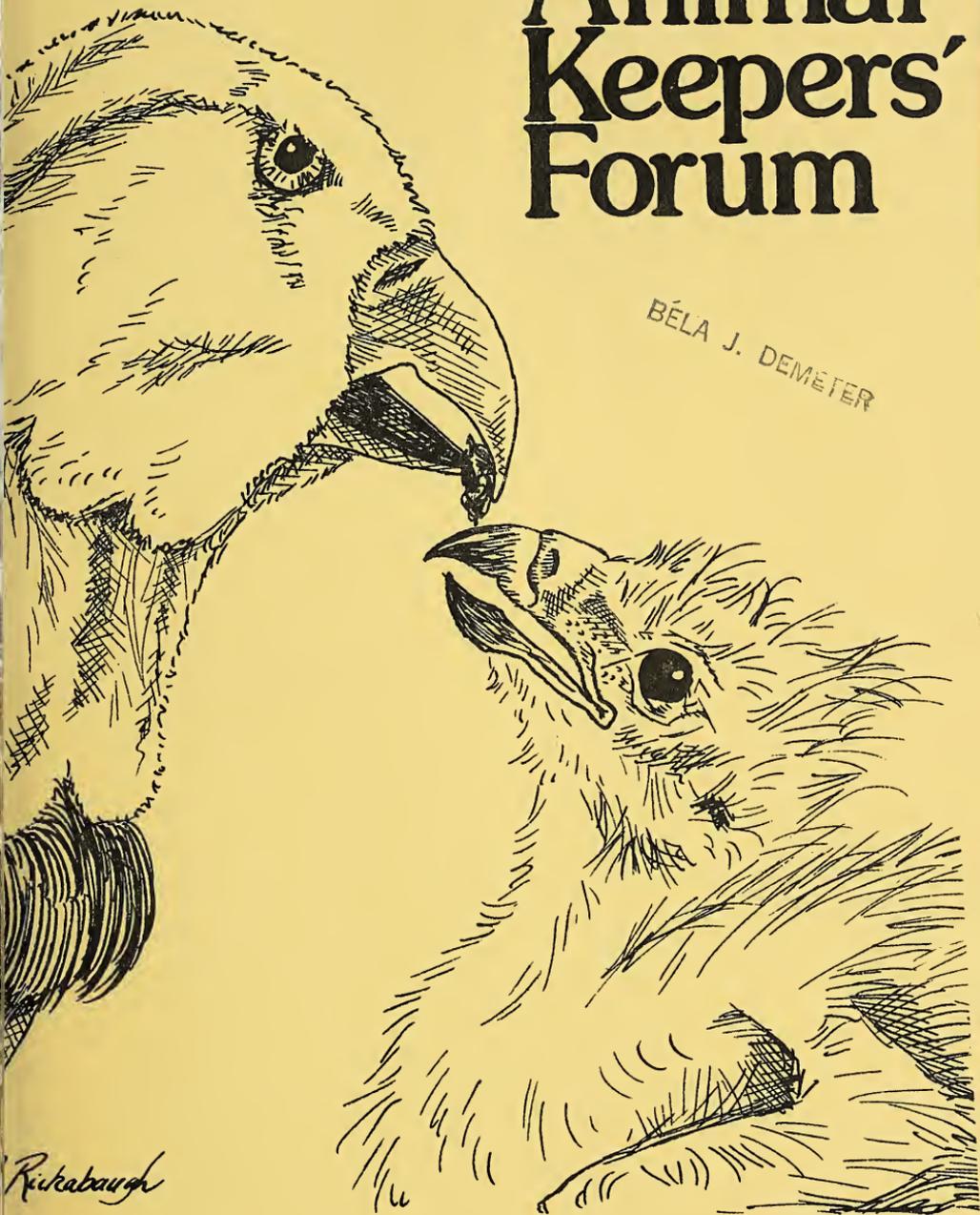
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# Animal Keepers' Forum

BÉLA J. DEMETER



*Dedicated to Professional Animal Care*

OCTOBER 1982

Executive Editor: Mike Coker  
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*This month's Keeper/Artist is Cathy Rickabaugh who is a Hospital/Nursery Keeper II at the Animal Care Center of the Phoenix Zoo. Her cover design illustrates the use of a "surrogate" parent hand-puppet used to feed two bald eaglets. The story of their hand-rearing and subsequent wild fostering can be found on page 247 of this issue. Thanks, Cathy!*

# Scoops and Scuttlebutt

## from the President

Dear Fellow AAZK Members,

I am very pleased with the response you gave to my request for volunteers for the Infant Development Chair, the Diet Notebook Committee and the International Affairs Coordinator position. The enthusiasm that has been shown is an indication of the professional attitude throughout our membership, and your desire to make AAZK a responsive professional association. Thank you.

Randy Adolph, of the St. Louis Zoological Park has been appointed to be the International Affairs Coordinator and will serve to keep us in touch with our fellow keepers in foreign countries.

Steve Taylor, of the Louisville Zoological Gardens, is the new head of the Infant Development Committee. With some data ready to publish, Steve will be continuing the job begun by Marcia Clevenger, and will be adding his own ideas to creating a usefull notebook on mother-raised animals.

The South Florida AAZK Chapter has been charged with the development of a Zoo Animal Diet Notebook. This idea originated a few years back from Bernie Feldman, and is now in the initial stages of organization.

I hope that all members who are interested in these projects will contact the Chairperson to offer your ideas and help. All of us working together can share the information and expertise that will continue to improve the care we give to our captive wildlife.

Thank you for your enthusiasm.

Sincerely,

Patricia E. Sammarco  
President

Zoo Keeper



# Births & Hatchings

## THE CALIFORNIA ALLIGATOR FARM.....Ted Daehnke

The California Alligator Farm would like to announce the following births and hatchings for the month of July 1982: 0.0.1 Black-tailed rattlesnake, 0.0.7 Cornsnakes, 0.0.18 Malayan Moccasins (we got them to start feeding with toads), 0.0.28 Red-eared turtles (including one set of twins).

## ATLANTA ZOOLOGICAL PARK.....Alan Sharples and Connie Waterstradt

The Atlanta Zoological Park is pleased to announce the following births and hatchings for May through August 1982: On 6 May, we saw the birth of our tenth Celebes crested macaque, a male named Kevin. A male mandrill was born on 26 July. Our pair of East African crowned cranes nested for the sixth straight year and are successfully raising four chicks. Other births include 1.1 white-tailed deer (DNS) and 0.0.5 prairie dogs.

In the reptile department, 0.0.10 hissing roaches, 0.0.23 snapping turtles, 0.0.7 diamond terrapins, 0.0.1 bog turtle, 0.0.19 leopard geckos (5 DNS), 0.0.2 fat-tailed geckos (AZP first), 0.0.1 black racer, 0.0.5 yellow rat snakes, and 0.0.5 Florida pine snakes. Also, 0.0.10 Mexican vipers were born.

## ST. LOUIS ZOOLOGICAL PARK.....Gary A. Michael

The following are the births and hatchings for July 1982: 16 North American ruddy duck, 4 Australian gray teal, 2 Puna teal, 2 Sharp-winged teal, 1 Garganey teal, 7 Common shelduck, 3 Patagonian crested duck, 4 Mandarin duck, 2 Stanley crane, 2 Eastern crowned crane, 1.0 Bactrian camel, 1.1 Stone sheep, 2.0 Speke's gazelle, 8 Degu, 3 Wild cavy, 1 Spider monkey, and 1.0 White-handed gibbon.

## SAN ANTONIO ZOO.....Janiece Solomon

Two Goeldis monkeys (*Callimico goeldi*) were born at the San Antonio Zoo on 7 August and 11 August in our new Children's Zoo Nursery. The colony is split into two unrelated groups, one group has a mother, father, sister, brother and now new youngster. The other group is a single male and female and their new baby. The whole colony has been on Breeding Loan from the Brookfield Zoo since October 1981. This marks the first Goeldis monkeys to have been born and survive at our zoo. The sex of the babies is still undertermined.

On 14 August a Nicobar pigeon (*Caloenas nicobarica*) hatched at the San Antonio Zoo. The Nicobar pigeon is an endangered species of pigeon from Indonesia. This is the second chick to hatch this year, the first one hatched on 3 May. Both were raised by the parents on exhibit in the Bird House.

Eight Palestine vipers (*Vipera xanthina palaestinae*) hatched on 2 through 5 August. This is the second consecutive year these have been bred at our zoo. Unlike the true vipers, these lay eggs and the incubation period is only 3-4 weeks. They are found in Israel, Jordon and Syria. They grow to a length of over four feet.

BIRTHS AND HATCHINGS, Continued

DALLAS ZOOLOGICAL PARK.....Mary Beth Lasher

July Births and Hatchings: Mammals - 1 Spider monkey, 1 Klipspringer, 2 Patagonian cavies, 1 Plains buffalo, 1 Celebes macaque, 1 Two-toed sloth, 2 Barbary sheep and 1 Suni antelope. Birds - 1 Red-vented Bulbul, 1 Ringed teal, 2 Oriental turtle doves, 1 White-winged dove, 1 Wood duck (DNS), 1 Palawan peacock pheasant. Reptiles - 7 Pueblan kingsnakes, 8 Baird's ratsnakes, 7 Thayer's kingsnakes, 5 Wood turtles, 7 Jalisco milk-snakes, 3 Australian river turtles, 2 Cretin vipers, 1 Central American kingsnake, 2 California mountain kingsnakes, 1 Pope's viper, 8 Panamint rattlesnakes, and 2 Arizona mountain kingsnakes.

August Births and Hatchings: Mammals - 2.0 Bongos, 1.0 Barbary sheep, 0.1 Sable antelope, 0.1 Besia oryx, 2 Patagonian cavys, 0.1 Okapi. Birds - 2 Nicobar pigeons, 1 Spotted dove, 1 White-cheeked touraco. Reptiles - 6 Grey-banded kingsnakes, 2 Levantine vipers, 9 Urutus, 3 Baird's ratsnakes, 6 Pueblan kingsnakes and 1 Wood turtle.



## Coming Events

### 10TH ANNUAL CONFERENCE OF INTERNATIONAL MARINE ANIMAL TRAINERS ASSOCIATION (IMATA)

October 25-29, 1982 Honolulu, Hawaii

### 5TH ANNUAL CAPTIVE WILDLIFE SYMPOSIUM

October 29-31, 1982 Louisville, KY

### 2ND DR. SCHOLL CONFERENCE ON THE NUTRITION OF CAPTIVE WILD ANIMALS

December 10-11, 1982 Chicago, IL

To be held at the Lincoln Park Zoological Gardens. For further information contact Thomas Meehan, DVM, at the Zoological Gardens, 2200 N. Cannon Drive, Chicago, IL 60614.

### SYMPOSIUM ON BREEDING BIRDS IN CAPTIVITY

February 24-27, 1982 Universal City, CA

Sponsored by the International Foundation for the Conservation of Birds in honor of Dr. Jean Delacour at the Sheraton-Universal Hotel. For information and registration forms, contact Gary Schulman, Delacour/IFCB Symposium, 11300 Weddington St., North Hollywood, CA 91601. (213)980-9818.

### ZOO RESEARCH CONFERENCE RESCHEDULED

June 16, 1983 Cincinnati, OH

Due to unforeseen circumstances, the Second Annual Research Conference that was to be held in Cincinnati has been postponed until 16 June, 1983. As time draws closer, schedules and materials will be sent out to those who registered for the conference. For those interested in this conference, you may write to Dr. Betsy Dresser, Dir/Research, Cincinnati Zoo/Kings Island, 3400 Vine St., Cincinnati, OH 45220. (513) 281-4701.

## 1982 AMERICAN ASSOCIATION OF ZOO KEEPERS AWARDS

The following awards were presented at the AAZK National Conference held in Toronto, Ontario, Canada on October 3-7, 1982. The Excellence in Zoo Keeping Awards are selected by the AAZK Awards Committee. The AKF Journalism Awards are selected by the Animal Keepers' Forum editorial staff. There was no Certificate of Merit for Zoo Keeper Education Award given this year.

### 1982 Excellence in Zoo Keeping Award Winners

- Brenda Lodge, Roeding Park Zoo, Fresno, CA  
Monty Simmons, Philadelphia Zoological Gardens, Philadelphia, PA  
David Wood, Philadelphia Zoological Gardens, Philadelphia, PA  
Al Porta, Philadelphia Zoological Gardens, Philadelphia, PA  
Chris Parker, Metro Toronto Zoo, Toronto, Ontario, Canada

### AAZK MERITORIOUS ACHIEVEMENT AWARD

In recognition of outstanding contribution in the field of wildlife conservation and animal husbandry

Frank Slavens, Woodland Park Zoo  
Seattle, WA

Wayne Schulenberg, San Diego Zoo  
San Diego, CA

### 1982 AKF JOURNALISM AWARD WINNERS

Best Mammal Article: "Observations On Breeding And Rearing The Fennec Fox (*Fennecus Zerda*) In Captivity"  
Renee Kilcoyne Sowards, Phoenix Zoo  
Phoenix, AZ

Best Bird Article: "Hand-rearing Sparkling Violet-eared Hummingbirds at the Brookfield Zoo"  
Lucy Gemlo, Brookfield Zoo  
Brookfield, IL

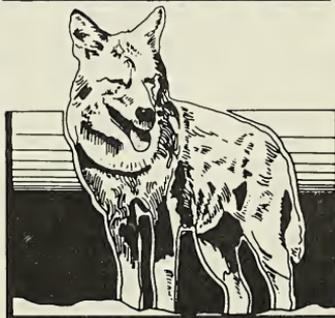
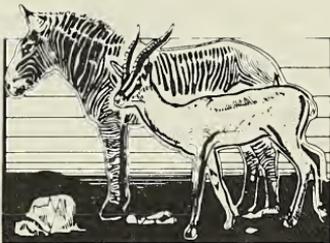
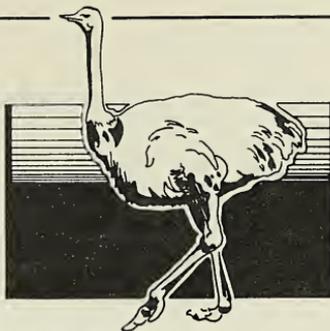
Best Narrative Article: "Zookeepers: Missing Link To The Public?"  
Dr. Sherman Rosenfeld, Executive Director  
The Discovery Center, Fresno, CA

Best Art Cover Award: December 1981 Issue of Animal Keepers' Forum  
Yoshi. Yonetani, Zoo Design and Education Lab, Kobe, Japan

Honorable Mention for Uncategorized Articles:

"How To Get A-Head At The Zoo"  
Mary L. Swanson, Fresno Zoo, Fresno, CA

"An Inexpensive One-Way Screen For Observing And Photographing Animals"  
Fred W. Koontz, National Zoological Park, Washington, D.C.



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HAND-RAISING RED CRESTED TOURACOS  
(*Tauraco erythrelophus Vieillot*)  
AT THE BRONX ZOO (NYZS)

By  
Angelo T. Arena  
Bird Keeper, Bronx Zoo

In the past we always had trouble hand-raising Touracos. Most of the chicks would last a couple of weeks and then expire. Last year the necropsy reported that the chicks died from sour crops. Touraco chicks seems to have endless appetites, so it was past practice to feed them until they were satisfied. However, they do not digest as quickly and the food remains and sours in the crop.

This season our first two eggs hatched on 21 and 24 April with chicks weighing 16.9 grams and 16.2 grams respectively, and were placed in a stick nest in an isolette for six days at a temperature of 92°F. On 28 April, they were moved to a Brooder with a temperature of 85°F. Our Curator, Dr. Don Bruning, came up with a special diet (SEE BELOW) and time schedule. We would feed every 1:15 minutes starting at 7 a.m. and ending at 5 p.m. For the first three days, .3grams of food was given at each feed; after that it was increased by .1gram each day. Every morning before feeding they were weighed and again after the last feed. They gained 1.5grams per day. One problem we had to check after each feed was for clogged vent. They did well, but on two occasions were put on Chloromycetin, an antibiotic, one drop three times a day plus .5ml of 5% Dextrose water for five days, due to weight loss.

At three weeks of age there was a slight diet change (SEE BELOW) until five weeks when the food was not diced as much. At ten weeks whole food was given four times per day. This consisted of cut up grapes, blueberries, bananas and pinkies mixed with our regular soft food mix.

At eight weeks of age they were moved to a regular perched exhibit where they are on the way to adulthood.

DIET - FIRST WEEK \*

3grams Pinkies  
1gram peeled grape  
1gram blueberry  
1gram banana  
1 Pet Drop  
4grams Mealworm Pupae  
Baby Cereal as needed  
Sprinkle Ca Lactate

DIET - THIRD WEEK \*

9grams Pinkies  
3grams peeled grape  
3grams blueberry  
3grams banana  
3 Pet Drops  
12grams Mealworm Pupae  
Baby Cereal as needed  
Sprinkle Ca Lactate

\*ALL OF THE ABOVE WERE FINELY DICED



## GRASS-ROOT GENETICS

By *Dora Jacobs, Keeper  
Rio Grande Zoo*

Probably the most complicated topic in animal care, either to learn or to teach, is genetics. That's because the subject is complicated and gets more complicated the more it is studied. Scientists make new discoveries in the field all the time, but the basics are still just as simple as when a monk named Gregor Mendel relieved the boredom of his brothers by serving them smooth green peas, smooth yellow peas, wrinkled green peas, or wrinkled yellow peas over the last half of the nineteenth century.

Genetics is the study of heredity. Heredity is the passing on of the characteristics from parents to offspring by genes, which are structures located on strips called chromosomes in the eggs and sperms of the parents.

Breeding is choosing the parents of something, putting them together, and hoping they'll reproduce. Whether or not we are successful is up to them, unless we load the dice by using artificial pollination or insemination.

Inbreeding is breeding parent and offspring or siblings to each other.

Linebreeding is breeding individuals related farther back such as cousins, or grandparent and grandoffspring, to each other.

Outcrossing is breeding individuals which aren't related, at least for as many generations as we can trace.

Purebreeding is breeding individuals of the same breed or species.

Hybridization is breeding individuals of different breeds or species to each other.

The above terms apply equally to earthworms, cucumbers, sheep, people, or anything else that has sexual reproduction. They do not apply to amoebas, New Mexican Whiptail Lizards, or anything else which clones itself without the help from another individual.

How does Genetics work? Two elephants look like each other and have babies that grow up into elephants because they have the same genetic code; that is, they have the same series of genes on their chromosomes in the same order like beads on a string. One elephant looks slightly different from another because there are various options on some of the genetic sites, sort of like round beads or square beads. These options are inherited, or passed on, by certain very formal and consistent rules. For instance, while all elephants have genes for teeth, only some have genes for tusks; therefore, some have tusks and others do not, and some have bigger tusks than others.

Parents can only pass on genes that they have. Some genes show on the animal and some are carried. Those that show are called "dominant", while those that are carried alongside a dominant are called "recessive". Two recessives side by side will also show on the animal. Occasionally two odd genes will both show because neither is dominant, but this is rare. Usually other pairs of genes are also mixed up in something like that. Occasionally there is a mutation, or rearranging of the gene structure itself, but very seldom. Radiation and heat can cause mutations.

Parents have two genes on any given site on a chromosome, except in their reproductive cells. Those split right down the middle and make two new

## GRASS-ROOTS GENETICS, *Continued*

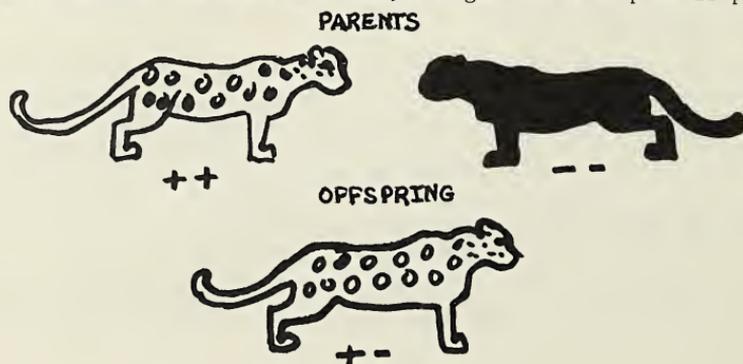
sets, which don't have to match because one side could get a dominant gene and the other a recessive. An offspring gets one set from each parent, adding up to a full double set. Offspring are exactly like their parents only if the parents are genetically alike. This can happen whether or not they are related; and it doesn't have to happen if they are related. A matching pair of genes before the cell splits is called "homozygous". An odd pair is called "heterozygous".

Breeding, if done with intelligence, can lead to very healthy and superior strains of animals and plants. If done by fools, it can destroy a breed or species. If done wisely, breeding can save an endangered species or salvage a breed that has gone to pot. The same strain or species can also be either salvaged or destroyed if left for Nature to take its course.

"Survival of the Fittest" also means "Extinction of the Unfittest". "Fit" means that an organism can live under prevailing conditions at the moment. It doesn't mean "Most desirable according to my preference." What is fit for one place or time may be unfit for another. Albino rattlesnakes are going to be eaten by the predators in the Malpais, but they will outlive the dark ones at White Sands. This tendency for a population of a species to gradually accommodate to the surroundings is called "adaptation", and it can only happen if the desirable characteristics already show up occasionally in the animals. Those particular animals will do better and develop a majority over time because the others will die off before they can breed. One individual animal (or plant) cannot adapt physically. If you take a black rattlesnake from the Malpais and turn it loose at White Sands, it can't turn white. But if it carries a recessive gene for albino and breeds with a local albino, some of its offspring will be albino, and they will have a better chance than the black ones of making it to breeding age.

There are standard symbols and abbreviations for the genetic process. Each species has a set of letters for each of its characteristics. They are used by everybody to state the genetic code, or the order of genes on the chromosome, for that species. For simplicity's sake, here is a set of genes using plus and minus rather than letters. Let us look at the jaguars at the Rio Grande Zoo.

Black ground color instead of red is sometimes seen in jaguars. They all have black spots. These are visible on black jaguars in bright light. Red happens to be dominant; black, recessive. Red individuals which produce only red cubs, no matter what color animal they have bred to, are homozygous dominant red (++) . All black jaguars are homozygous recessive (--). If these two homozygous animals are bred to each other, all their cubs will be red. In the sex cells, one gene of each pair is passed on



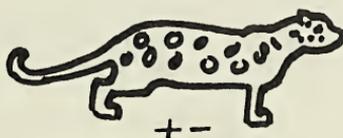
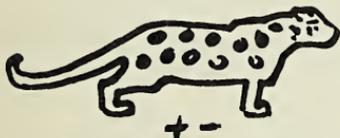
GRASS ROOTS GENETICS, Continued

to the offspring from the parents. All offspring have one of each kind of gene. Their genetic code for background color is + -, heterozygous dominant. Their color is red because red fur pigment is dominant over black and always shows if it is present. They are all carriers of black, which is recessive.

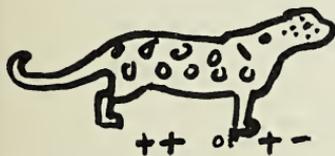
The homozygous and heterozygous dominant jaguars look just alike. The only way to tell which is which is to breed them to homozygous recessive animals. This breeding to a homozygous recessive individual, whether related or not, is called a backcross. The black grandparent should do just fine unless some horrible defect has turned up which it wouldn't be right to continue, or which would kill the offspring before birth so that we wouldn't know they ever existed and our statistics would be ruined. Any jaguar would do whose genetic makeup is known, and a homozygous recessive is always obvious. As long as there are enough offspring to make a reasonable sample, there should be some homozygous recessive offspring, in our case black jaguars, because the recessive black gene will double up with the recessive gene from the homozygous black animal. The black jaguar has only black genes.

Now, if we breed those cubs to each other at adulthood, the genes can sort themselves out in three different ways when they split in the sex cells and then recombine in the offspring. There will be some ++, homozygous dominant, red babies. There will also be + -, heterozygous dominant babies, also showing the red ground color. And there will be some --, homozygous recessive, black babies, throwbacks to the black grandparent.

**PARENTS**



**OFFSPRING**



**A BACKCROSS**



**PARENTS**



**OFFSPRING**



## GRASS ROOTS GENETICS, Continued

In brief, wise breeding of animals involves the intentional matching up of desirable genes and the systematic elimination of undesirable ones. The quickest way to do this is by inbreeding or linebreeding good stock, euthanizing or neutering defective offspring, until you find that you have accidentally eliminated something you need; and then introduce an outcross which has the missing genes plus as many as possible of the desirable genes you already have. Starting with an outcross perpetuates many more recessives than you can detect in the animal, and continuing to outcross confuses the issue beyond belief, plus running the risk of losing valuable recessives as they become heterozygous. In mice or anything else which has lots of babies, often this isn't necessarily a disaster, but with musk ox or elephants, it could take centuries by hit and miss to stabilize the strain. If the species is endangered, the miss could be final.

(Editor's Note: The preceding article was reprinted from GOOD GNUS, the newsletter of the Rio Grande Zoo AAZK Chapter, Vol. V, No. 1, April 1982 with permission of the author. It is the first part of a series on genetics. Look for a continuation of this series in upcoming issues of AKF.)



## Information Please

Information is requested concerning captive husbandry/propagation of Felis (Herpailurus) yagouaroundi with particular emphasis on exhibit design/dimensions, diet, behavior, breeding information and successes. Please send information to: Kevin May, Animal Staff, c/o Central Florida Zoological Park, P.O. Drawer 309, Lake Monroe, FL 32747.

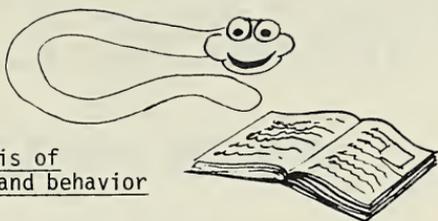
I am conducting a population density study of the Swanson's Hawk (Buteo swainsoni) on the Pawnee National Grasslands of Colorado. If anyone has information concerning this bird's density, migration or social patterns, I would appreciate your help. Please send any information to: Linda Stormberg, 304 Loomis Ave., Colorado Springs, CO 80906.

I am seeking information on all aspects of the building of rehabilitation flight cages for the injured raptors that we are expecting this fall and winter. Anyone having such information is asked to contact Tri-State Bird Rescue and Research, Inc., c/o Steve Sarro, Box 340B RD# 2, Hockessin, DE 19707.

Information is requested concerning any zoo or aquarium utilizing alternative energy sources such as methane gas, the sun, wind etc. Also the use of major labor/time-saving programmes or devices. Information obtained will be utilized in a discussion paper at the 1983 A.S.Z.K. Conference. Please send any information to: Chris B. Banks, Keeper in Charge (Reptiles), Royal Melbourne Zoo, P.O. Box 74, Parkville, Victoria 3052, Australia.

Can anyone give me some advice on what to feed a baby snapping turtle? Shell is 2" long. I am currently using "Reptomin" by Tetra and chopped meat and am concerned if this is a completely balanced diet. Information on diet, frequency of feeding and amounts needed. Please send to Diane Lord, P.O. Box 89, Storrs, CT 06268.

# Book Review



The Mammalian Radiations: An Analysis of trends in evolution, adaptation, and behavior

By John F. Eisenberg  
Published by The University of Chicago Press,  
5801 E. Ellis Ave., Chicago, IL 60637  
1981; price \$45.00

Review by Janet J. Gailey-Phipps  
Johns Hopkins University

My initial approach to this volume entailed a great deal of skepticism. How can the entire class Mammalia be dealt with in all the stated parameters and still be in a volume one can lift off the table? Yet, Eisenberg has done an excellent job. However, this book is not an "armchair" book but, instead, is one to visit repeatedly and digest in parts.

The organization begins with the historical perspective: paleontological evidence and what is known or surmised in natural history ecology and behavior of extant and extinct classes. Following this discussion of early radiations and phylogeny of behavior, the next section introduces the mammalian orders with general ecological, natural history and physiological descriptions. Parts 3 and 4 are the real "meat" of the book. "Part 3: Macrophysiology" discusses ecological energetics and builds to populations elaborating on niche constraints, reproduction, life history strategies, etc. Lastly, Part 4 introduces behavior as a field of study--comparing and contrasting interaction systems among mammals, e.g. social organizations, influences on, and pathologies of social systems.

Overall Eisenberg has compiled a monumental volume of data to discuss mammalian evolution and development of various adaptive syndromes. The 90 pages of references indicate clearly the effort he put into this volume. His style of writing is clear and readable. Much of the voluminous data necessary for such an undertaking is presented in many tables and graphs which are clear and agree with the old expression, "a picture is worth a thousand words".

In closer perusal of areas of my familiarity (behavior, ecological energetics, and marine mammals), I found these areas to be well and clearly covered. However, in the marine mammal sections there were a couple of small errors. In "Pinnipeds", his taxonomy is somewhat antiquated, e.g. *Pusa*, *Pagophilus*, and *Histiophoca* are more recently combined in *Phoca*. In the Cetacean section I question his statement that the Cetacean medulla oblongata is insensitive to CO<sub>2</sub>. This was previously believed true for all diving mammals, but has been proven wrong for Pinnipeds, and possibly would be similar in Cetaceans. One might surmise in such a broad range of material in a book of this scope there would be a scattering of small errors--one cannot keep abreast of all topics in all members of the class Mammalia at all times!

The detailed Table of Contents, Index and especially the subheadings in the margins will make this text easy for the keeper. This book has information for all academic levels: there are complicated parts, e.g. life tables; where the discussion requires a knowledge of calculus, but generally his style makes even complex areas (many in energetics) clear and easy to understand. I would strongly recommend Mammalian Radiations for a text or alternative text in college mammology courses, and it is definitely a "MUST" for a zoo reference library.



# Missing LYNX

## WALKING HAND-REARED CRANES AT THE BRONX ZOO

By

*Rena Wynne Schilsky*  
FOZ Volunteer, Bronx Zoo

After having spent a few years as a Friend of the Zoo at the Bronx Zoo, a volunteer program of tour guiding, I found out that the Bird Department was recruiting "crane-walkers". While in FOZ, tours of the World of Birds was a speciality of mine and so this seemed to be an ideal choice of activity for me.

The Bronx Zoo has had an active and influential role in the breeding of cranes. This is especially important since of the 15 species of cranes in the world, 7 are endangered. We have had successes with several species.

Hand-reared cranes are walked by a volunteer or keeper on a daily basis, weather permitting, as soon after hatching as possible - depending on the condition of the chick - to insure that they get sufficient exercise for proper leg development, muscle development and weight maintenance. Too rapid weight gain, in itself, can cause leg problems, particularly bowing, although new diets specifically formulated for growing crane chicks is better controlling the problem of weight maintenance.

Whereas a parent-reared chick will naturally follow the parent bird - the "walking" behavior - we, as substitute parents must establish a relationship with the chick to insure that it will follow us, being careful not to make a pet of the crane so that it will not orient itself so strongly toward humans and fail to react normally with others of its own species. We have been successfully "treading this fine line" and while young birds, oriented toward humans to a degree, may beg for food from a human, as they mature they react normally with other cranes, evidenced by the fact that some of our zoo-reared cranes have produced young themselves; the only obvious behavioral difference being that these birds are aggressive toward humans, showing no natural fear.

As chick being walked for the first time will not immediately follow its surrogate parent, but, instead, may take off for cover under the nearest bush. In one extreme case, it took an hour of patient clocking, whistling and finger-wagging ( a visual stimulus) to coax the chick out. When he had begun to move about, it is usually best to steer him from behind - a kind of "herding" action. After this yields results, the walker can then move in front of the bird to see if it will follow. Again, patience and coaxing may be needed. (As a volunteer and so not required to be in uniform, I find wearing sandals and painting my toenails red, also helps. I don't know if the red color attracts the chick or if it is because my pinkie resembles a delicious "pinkie", one of the newborn mice that are part of the crane chick's diet. However, this technique is not especially advisable for male keepers.)

As the chick begins to follow readily, I find that I can put distance between myself and the chick to keep him actively walking - this varies with the size of the bird and its behavior, but can be from one to a few yards in space.

Besides being essential, having the opportunity to observe the behavior of individual chicks is one of a "walker's" rewards, though, the enjoyment derived from long periods of observation is sometimes denied the

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keeper who has a busy schedule of varied tasks and so cannot spend as much time with individual birds as a volunteer can. Some birds are "eaters" and must be carefully watched so that they don't eat large pebbles of other inedibles which could cause alimentary problems. This extreme "eating" behavior is an off-shoot of the chick's natural pecking instinct that helps it to gain knowledge of its environment. But, while parent-reared chicks have the example of a parent bird to follow, and, thus learns what is good to eat, we must now assume that "teaching" role for the hand-reared chicks.

One Hooded (*Grus monacha*) crane chick was notorious for his "eating" and even tried to gulp down a cigarette butt. When walking him, you could not turn your back on him. Another crane, a (*Grus vipio*) of White-naped, was a "runner". Rather than following, he would dash off into a wooded area adjacent to the lawns and dirt paths where we usually walked our charges. I found the best way to deal with this kind of behavior is to wait. Some coaxing such as hand-clapping was helpful at times. Increasing the distance between myself and the chick while being careful to never lose sight of him also worked, but, on one occasion, it took three of us a considerable chase to catch him and, later on, his exercise periods were confined to an enclosed yard. On the other hand, one young Sandhill (*Grus canadensis*) was so timid it seldom strayed far from its human "mother." It would run to me for protection if the mature cranes in nearby pens began their raucous call, or at the sight of an overhead plane, least it be a hawk or other threatening predator.

Some cranes, two Demoiselles (*Anthropoides virgo*) in particular, were docile enough to be walked two at a time. These chicks get on well with their siblings. Others are more belligerent to their own kind. While these chicks may follow their surrogate parents as well as any dog walks on a leash, they must be kept from other chicks so they don't injure them. As the larger and older juveniles are kept in outdoor enclosures in groups (juvenile grouping is common in nature) these aggressive chicks must be extra-closely watched when finally introduced into this environment.

Having watched fuzzy chicks grow into lovely, graceful adults for several seasons now, I can well appreciate Aldo Leopold in his "A Sand County Almanac" when he says - "Our ability to perceive quality in nature begins, as in art, with the pretty. It expands through successive stages of the beautiful to values as yet uncaptured by language. The quality of cranes lies, I think, in this higher gamut, as yet beyond the reach of words." And I know others who have since joined the ranks of "crane walkers" will all agree.



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LOS ANGELES was the sight of an undercover investigation leading to the seizure of 300 ivory carvings valued at \$1 million. The collection, found at the Stanley Masry Gallery, violated the California Endangered Species Act. As well as paying a \$5,000 fine and forfeiting his collection, Masry agreed - as part of his no-contest plea - to pay \$1500 for an advertising campaign denouncing the slaughter of elephants and also to give \$3,000 to the city to set up public display booths at the County Zoo and Los Angeles airport. The display will make plain that the ivory was yanked from the heads of slain elephants--and will be seen by visitors from all over the world to the 1984 Olympics.

# *An Encouraging Word.....*

## THE RISE OF THE KEEPER

By  
*Lawrence Curtis*  
*Oklahoma City Zoo Director*

Initially I titled this paper "The Art and Science of Zoo Keeping." I did so because it has long been my firm conviction that the successful keeping of wild animals in captivity constitutes *both* an art and a science. To carry the thought further, it appears to me that zoo keeping really is a merging of the individualistic subjectivity of the artist ameliorated with the exacting methodology and objectivity of the scientist. Perhaps this is a unique combination of talents, the merging of an art with a science; or perhaps the concept itself is a contradiction. I'm not certain. Nevertheless, it is an intriguing concept and one which does seem to fit the peculiar circumstances of zoo keeping.

Also, I have always felt rather strongly that the person working directly with the animals, i.e. the zoo keeper, must reflect this artist-scientist combination. Curators and directors may or may not demonstrate it but, in my experience, the best of animal people do.

It therefore has always seemed to logically follow that the firing and development of trained zoo keepers must be a major objective of our profession. I believe our zoo has clearly made its contribution towards that end. Indeed, I take pride in the exceptionally high number of men and women in the Oklahoma City Zoo who have combined formal academic training with the pragmatic hands-on animal experience so essential to a successful zoo keeper. And I do see in all of these people the dedication and fervor of the artist but tempered with the more rigid and formal discipline of the scientist.

However, as my article progressed and I further explored the changes in zoo management which have produced this relatively recent change in zoo keeping, it became clear to me that the title of my article needed changing. Although I do believe my thesis is valid, that zoo keeping is an art as well as a science, it seemed to me that my story was really about the "rise of the keeper".

It has been clear to me after instigating these changes in institutions with which I have been associated, particularly Oklahoma City Zoo, and having observed them generally nationwide, that some observations on its evolution might be of interest.

Prior to this enlightened era of zoo keeping, zoo recruited their keeper force primarily from off the street or from off the farm. The former source generally lacked any animal experience; whereas, the latter often brought with it an excellent rural background in farm animal husbandry. In these "good old days" of zoo keeping, the keeper force was invariably completely male (perhaps zoos were not just a little bit chauvinistic). Few keepers in those days had either prior zoo experience or any formal training in zoology. In all candor, many zoo administrators in those "good old days" also lacked formal training themselves; indeed, those insecure ones may have been reluctant to hire trained personnel had such applicants been available. On the other hand, many of those academically untrained early zoo managers, bless them, did recognize the need to give budding zoologists experience as zoo keepers. Certainly, many of today's zoo directors made their entry into the field by virtue of just such an opportunity, yours truly included. Perhaps this fact partly explains the

## THE RISE OF THE KEEPER, Continued

ascendency of the professionally trained zoo keeper.

Historically, a real problem of attracting trained zoo keepers was the far lower pay and benefit plans then available to animal keeping personnel. As recently as 10 years ago, in the Oklahoma City Zoo and many others, personnel assigned to care for valuable animals were classified as laborers. Well do I recall in earlier years struggling with city classification systems to eliminate the laborer title from the zoo keeper class. We even created quaint and sophisticated titles - not entirely facetiously - to make up in job-related pride what could not at the time be accomplished in the pay envelope. Thus, as a youthful director of the Fort Worth Zoo, I well recall a feeling of accomplishment when a municipal official was persuaded to accept, in lieu of zoo laborer, job titles of herpeculturist, aviculturist, aquaculturist, etc., and with the issuance of appropriate name and title tags to boot.

In 1972 at the Oklahoma City Zoo we succeeded in a more meaningful change when we discarded the laborer title, rewrote the job descriptions and created the position of "animal technician." One personal trait required in our zoo keeper (animal technician) job description is that our people must have an "animal karma" or a "brown thumb," the zoological equivalent of the horticulturists' proverbial "green thumb." In the decade since, we now have three separate animal technician titles (I, II, and III). Although I personally prefer the more nostalgic euphemism of zoo keeper, we do live in an age of technologically-oriented jargon and the title "animal technician" seem a more appropriate one.

As American zoos proliferated both in quantity and quality from the '50s into the '70s, zoo management made the inevitable shift in personnel requirements to reflect a greater need for formal technical training, primarily in the fields of natural history (especially zoology), animal husbandry and wildlife management (and, today, ethology). As higher management positions became filled with academically trained personnel, the basic law of supply and demand took effect such that in the '70s there were more applicants with formal training than vacant curatorial jobs open to them. This was a new situation for zoos.

Then, as now, zoo directors regularly received letters from recent or incipient college graduates seeking zoo management positions. Most zoos required a combination of formal training and actual or pragmatic "hands-on" (hands-in!) zoo experience. However - and here is the stinger - the vast majority of these applicants lacked any kind of zoo experience. This lack caused a "Catch 22" type of situation: they did not qualify because of a lack of experience and were not hireable until they got such experience. But how to get work experience without first getting work?

Our solution to these letters was simple - or so we thought. I prepared a "form" response which was sent as an original to each correspondent ( I detest form letters). I explained the critical need for actual zoo work experience as a supplement to formal academic training. My letter ended by suggesting that the applicant seek another type of zoo job - any job which might be vacant. In this way the applicant could break into the field and then be available for an animal job when one opened up. Jobs such as watchmen, custodians, concessions and grounds personnel what we call "entry-level" positions - were suggested and the applicant invited to apply "if he felt both willing and qualified." Few, of course, responded. But most who did were hired and eventually proved their mettle and moved into animal keeper positions. A significant number are now in management-level positions in this and other zoos.

## THE RISE OF THE KEEPER, Continued

Once while visiting in the Frankfurt Zoo, I witnessed a fascinating interaction between the zoo director and his assistant which rather poignantly illustrates the problems involved in hiring academically trained personnel in zoos. By this I mean people who have had no prior zoo experience but who will "take anything" to get on board. A young man with a recently acquired Ph.D. had been hired the week before for a non-animal related job, preparatory, he hoped, to eventually qualifying for a highly coveted keeper or curatorial position. On this day the young man had become disillusioned with his job and was threatening to quit. The director, aghast at such an ungrateful attitude snorted, "Well, if he balks at this job, what else might he do?" Subsequently, the young man reconsidered his action and resumed his work. His duties: in charge of all of the men's toilets in the zoo.

As the '70s closed, the shift in availability of formally trained and experienced personnel interested in zoo keeper positions had come full swing. We now enjoy a very high percentage of such personnel applying for and filling these positions. The number increases yearly, not only in our zoo but nationwide. There has also been an equalizing of the sex ratio with more female keepers being hired, although for years the Oklahoma City Zoo has had a high number of female personnel working in animal areas.

In this era of the rise of the academically trained keeper, we also see more keepers with prior work experience in other zoos, indicating an increased professional mobility. Such mobility in our profession has been evident for years at the management level, but now it is clearly occurring at the zoo keeper level as well.

Within our own zoo the increase in trained and experienced zoo keepers has also produced a higher upward mobility by promotion from within. This welcome situation certainly is a result of having more trained personnel available for a given job, more so than we had previously experienced. Within certain guidelines, we have also encouraged lateral mobility in which personnel desirous of additional work experience but in different disciplines may gain it through a transfer to other positions within the organization.

Reflecting this rise of the zoo keeper on a national level is the development of course work and degree plans for zoo animal keeping in two academic institutions: one in Florida at the Santa Fe Community College and the other in California at Moorpark Junior College. We have alumni on our staff from both institutions and their performance attests to the value and integrity of the programs at these institutions. Indeed, Jim Ellis, who heads the program in Florida, was one of our zoo keeper "trainees," hired in the early '70s as a custodian, who then moved through the ranks in a variety of zoo keeping jobs before accepting a management position at another zoo.

Another accomplishment in the rise of the keeper, one especially significant professionally, has been the publication of the national journal, *Animal Keepers' Forum*, published monthly by the American Association of Zoo Keepers. This is an excellent source of information and one frequently contributed to by Oklahoma City Zoo personnel.

Paralleling the rise of the keeper has been the development of an enhanced pride in the work program, a professional self-esteem and an active pursuit of technical goals and objectives. Zoo keepers, here at the Oklahoma City Zoo and elsewhere, carry out research and animal management

## THE RISE OF THE KEEPER, Continued

programs and prepare sophisticated reports, articles and scientific papers for publication. We frequently send keepers to participate in professional symposia and seminars. Our own technical journal, *Oklahoma City Zoo Journal*, often contains papers written by zoo keepers; and ZOOSOUNDS, our lay zoo magazine, is also regularly contributed to by keeper staff.

In brief, the rise of the zoo keeper has produced a professional self-esteem consistent with the heightened professional nature of the work program.

What is the long term significance of the rise of the keeper? One obvious benefit will be the continuation - perhaps an acceleration - of higher quality animal husbandry care in zoos. Secondly, I see zoo keepers making greater original contributions to the art of zoo keeping and the science of zoo biology.

I believe our zoo can take justifiable pride in the role it has played in the rise of the keeper. Speaking as one who has moved up within the system, it has been a privilege to participate in its development and to observe the rather dramatic and exciting results which we see today.

*(Editor's Note: The preceding article originally appeared in ZOOSOUNDS, Volume XVII, Number 4, August 1982, a bi-monthly publication of the Oklahoma Zoological Society, Inc. It is reprinted here with permission of both the editor and the author, Lawrence Curtis.)*



## Publications Available

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"Resources for Collection Development in a Zoo Library", a bibliography by Mary Lee Jensen, is a listing of references for zoo libraries. Special emphasis is placed on captive breeding and conservation of endangered species. This document would be useful to any zoo seeking to initiate, evaluate or enlarge their library collection. A free copy of this bibliography can be obtained by writing ZOO BIBLIOGRAPHY at the following address:

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## RETURN TO THE WILD.....

### THE HAND REARING AND WILD FOSTERING OF TWO BALD EAGLE CHICKS

By  
Cathy Rickabaugh  
Hospital/Nursery Keeper II  
Animal Care Center, Phoenix, AZ



The team from the U.S. Fish and Wildlife Service had some anxious moments rescuing two bald eagle chicks (*Haliaeetus leucocephalus*) from the swiftly rising waters of a desert reservoir north of Phoenix, Arizona.

The parent birds had constructed their nest in a cottonwood tree that stood near the reservoir. When unexpectedly heavy rains fell, the water rose rapidly and threatened to engulf the nest.

On the day of the rescue, 12 March 1982, the chicks were 5 and 3 days old. They were transported to the Phoenix Zoo in a styrofoam picnic cooler, nestled in rags that were placed on a 1" thick pad of plastic foam. Heat was provided by two hot water bottles beneath the pad.

Upon arrival, they were a little overheated, but soon cooled down and otherwise seemed healthy and strong. They were weighed immediately (165g and 113g), then fed all but the bones of two leghorn chicks and bedded down for the night. The eaglets remained in the Animal Care Center for the next eight days.

Housing was provided in a cardboard box measuring 18" x 20" x 12" deep. The box was lined with towels which were draped over the edges. The chicks preferred to hang their heads over this padded edge after eating. It was an alarming sight at first, but apparently this is a natural position.

Their "nest" was then placed in a circulating air incubator with a dish of water for humidity. The temperature was adjusted to the lowest setting (78°F). This proved uncomfortably warm for them, so, one by one, the four arm access holes were opened for ventilation. They were still panting, so the lid was propped open. Finally, the incubator was turned off and the lid raised. They were still protected from drafts by being in the incubator, but were now comfortable at room temperature (72°F). To minimize distraction from passing humans, the front of the incubator was papered.

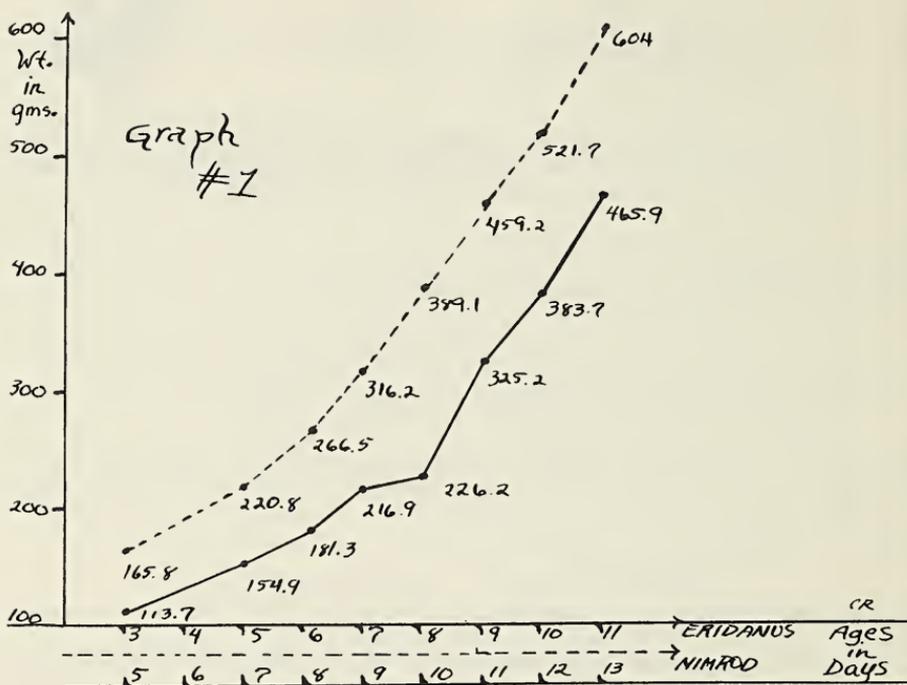
Their diet consisted of fish, rabbits, mice and bird of prey diet (in-house recipe - contains Vilecsol electrolyte vitamins). The zoo veterinarian, Dr. Hood, and the Security Department provided cottontail rabbits, jack-rabbits, bass and bluegill from the grounds and lakes of the zoo.

The chicks were given all parts except the heavier bones (pinkies and juvenile mice were fed sectioned with bones intact). This included roe sacs, full mammary glands, coagulated blood (calcium) and skin (vitamin D) partially plucked fur (International Zoo Yearbook, Vol. 12, pg. 137).

For the first four days the chicks were fed on demand. This averaged six times a day from 7:30 a.m. to 9:00 p.m. On day five, the schedule was reduced to four feedings a day in the same time span. They were given

HAND REARING AND WILD FOSTERING OF TWO BALD EAGLE CHICKS, *Continued*

their fill (see Graph #1) at each feeding, and only fed again when their crops were empty. Both chicks much preferred the red rabbit meat over the white fish meat. The drop in the graph (ages 8 and 10 days) corresponds to a day of feeding fish following a day of feeding rabbit.



Elimination was at first suspensefully awaited. It soon became apparent that all was moving along nicely. In fact, by day 3, their defecatory aim had improved so well that they could paint the walls through the arm access holes of the incubator!

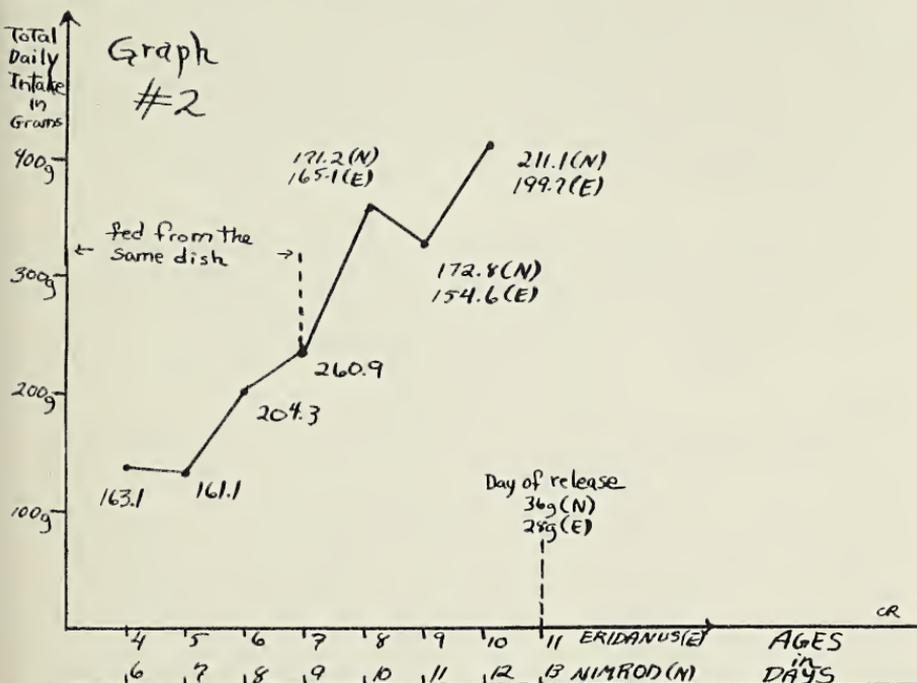
Our goal was to prevent these chicks from responding too strongly to humans as their food source, as they were to be returned to the wild. To this end, Dr. Hood's wife, Betty, constructed a beautiful replica of an eagle's head as a hand puppet. The eaglets responded to it with enthusiasm.

The growth chart indicates how quickly they grew, tripling their weights in eight days (see Graph # 2). The younger chick, "Eridanus" (the river), was a less aggressive feeder than its' sibling, "Nimrod" ( the hunter). Often Nimrod would outreach Eridanus to obtain an item that was offered to the younger chick, even snatching food from Eridanus' beak before it had been swallowed.

The chicks were returned to the wild on 20 March 1982. A local television station (KOOL 10, CBS) donated the use of their helicopter for the project. We flew north out of Phoenix, passing the almost submerged tree where the chicks' parents had nested. A new nest, constructed by USFWS team the day after the rescue, sat in the topmost branches. Unfortunately, the adult birds had not returned.

HAND REARING AND WILD FOSTERING OF TWO BALD EAGLE CHICKS, Continued

The helicopter landed above the cliff where the foster parents were nesting. They had been under observation during the nesting season, and were known to be brooding overdue eggs. These birds had raised young the previous year.



The chicks were placed in a sturdy purse on top of two dead rabbits and zippered in snugly. Terry Grubb, of the Rocky Mountain Experimental Station, rapelled down to the nest. He replaced the two added eggs with the chicks and rabbits, then went on down to the river. As he walked out by way of a side canyon, he observed one adult bird return to the nest. Within six minutes, the eagle was feeding the chicks from the rabbits provided.

Both chicks fledged on 26 May 1982.

In addition, a different chick was fostered directly when one of its parents disappeared. The remaining parent ceased to feed the chick which was then placed in a foster nest that held a chick of approximately the same age. The parents raised both eaglets.

Arizona's bald eagles were an overwhelming success this year. Thirteen of these desert nesting raptors fledged this year, with a total of 1400 bald eagles nationwide (USF&W).

Thanks are due to : Dr. and Mrs. Howell B. Hodd, Duane Rubink (USF&W), Terry Grubb, Dr. Kathy Ingram, DVM, Dr. Robert Ohmart, and the many people who helped to STOP ORME DAM, thereby protecting irreplaceable eagle habitats.

Products mentioned in text: Vilec-Sol by Vet-A-Mix, Inc., Shenandoah, IA 51601.



# Legislative News

Compiled by Kevin Conway

## USFWS PUBLISHES REGULATIONS FOR DISPOSAL OF FORFEITED/ABANDONED PROPERTY

Under the 1978 Fish and Wildlife Improvement Act, the Secretary of the Interior or of Commerce, depending upon the species involved, has the authority to dispose of abandoned or forfeited fish and wildlife in any manner he deems appropriate, including loan, gifts, sale or destruction. On 23 April 1982, the Fish and Wildlife Service published its final rule in the Federal Register concerning the disposal of forfeited or abandoned property.

Under the new regulations, all property must be held for 60 days before disposal, except for wildlife which may be liable to perish or greatly decrease in value by being retained. In that case, it may be disposed of immediately. Once the wildlife is forfeited or abandoned to the U.S. government, the effect of any prior illegality on subsequent use of the wildlife is terminated. FWS's priority in disposing of wildlife is:

(1) return to the wild; (2) use by FWS or another Federal agency; (3) donation or loan; (4) sale; and (5) destruction.

Wildlife returned to the wild must be released to suitable habitat within the historical range of the species. In addition, before such wildlife is released, permission of the landowner must be obtained.

Wildlife used by the Departments of Interior or Commerce, or transferred to another government agency can be used for many purposes, including training officials to perform their duties, educating the public about conservation of wildlife, and enhancing the propagation or survival of a species or other scientific purposes.

Originally, FWS proposed that loans or donations be restricted to non-commercial purposes. AAZPA submitted specific comments to FWS regarding these proposed regulations: first, that many organizations which have supported FWS efforts to conserve wildlife would not qualify; second, that the distinction would be in direct conflict with the Memorandum of Understanding on the Disposition of Seized Wildlife on which AAZPA has been working with the Departments of Interior, Justice, Agriculture and Treasury. In the final rule, FWS deleted the term noncommercial.

Wildlife may be donated or loaned for appropriate purposes if the recipient qualified under the law applying to the particular species. If several applicants apply for loan or donation, FWS will use their stated purposes as a factor in its choice of recipient. The recipient is to be responsible for all costs associated with the transfer of animals, including costs of care, storage and transportation. Retransfers of wildlife may not be made without prior authorization.

FWS will sell only wildlife which may be lawfully traded by private individuals in interstate commerce. Migratory birds, bald or golden eagles and CITES Appendix I specimens are prohibited from being disposed of by sale. Species listed as endangered or threatened under the Endangered Species Act and wildlife protected by the Marine Mammal Protection Act can only be sold if the species may be lawfully traded in interstate commerce. Sale proceeds will be used to reimburse FWS for any costs it is authorized by law to recover, or to pay any rewards which may be paid from FWS funds.

Wildlife not disposed of in another manner will be destroyed. Although that is mandatory under the regulations, there is no deadline under which disposal must be completed. As long as there is potential for the wildlife to be disposed of in another way, FWS will be reluctant to destroy it. These regulations became effective 24 May 1982.

---K. Vehrs in AAZPA Newsletter



By

Ted Daehnke, Head Keeper  
California Alligator Farm

One function of zoos had been to preserve species whose continued existence in the wild is in question. To serve this function better than a museum with its freeze-dried specimens, the zoo must do more than maintain a few individuals on display. It is necessary that we preserve a large number of unrelated individuals and encourage breeding within this group. In this way we come closer to preserving the entire species with all its diversity rather than preserving the traits of a few individuals of that species.

The ultimate goal of any captive breeding program should be reintroduction of the species into the wild. At some future date the species' habitat may be restored to the point that it will be possible only if the species has retained its genetic diversity in captivity. A highly inbred population may be capable of surviving in captivity, but is unlikely to be able to meet the varying demands of existence in the wild.

Many reptiles pose serious difficulties to this goal. It's not unusual for a zoo to display a group of 15 antelope and the expected annual reproduction from this group may well be under ten. On the otherhand, rarely do we see more than two or three anacondas on display and one female might produce 50 or more offspring in a year. Often a zoo which has become successful with a particular species of reptile becomes the supplier of that species for most of the zoos in the country. Other zoos which later begin captive breeding with this species often use the offspring of the original pair as their breeding stock. Eventually, the entire gene pool for this species in North American Zoos may stem from no more than a dozen wild-caught specimens. These few individuals should not represent the entire population of this species.

Zoos need to apply the studbook system presently employed for some rare species to all species under their care. By breeding as many wild-caught pairs as possible and by restricting breeding to unrelated individuals, considerable genetic diversity can be maintained. The major drawback to this policy is that from any pair only a few offspring will be of use in future breeding programs. Disposing of surplus offspring is a problem reptile houses already face. The simplest solution is to humanely destroy the surplus. In the wild, natural selection chooses which individuals will survive. Unless this natural selection can somehow be duplicated in captivity, it is probably best to rely on some form of random selection process. Otherwise, those characteristics we choose to favor might not be appropriate for the species' survival under natural conditions.

The surplus animals could be put to much better use if zoos would make them available to private individuals. By turning over part of the job to private individuals it would be possible to maintain much larger populations of each species. Two problems have made zoos reluctant to put exotic animals into private hands. The chance that the animals might not be properly maintained and the possibility that the animal might prove dangerous to the new owner or others. The nationwide system of reptile registration recently proposed by NOAA might help to quiet both fears. An individual who has demonstrated an ability to successfully and safely maintain reptiles in the past might be a good candidate for zoo surplus. The registration system would also enable the private collector to avoid inbreeding which might reduce genetic diversity.



We are indebted to the AAZPA Newsletter for allowing us to reprint portions of this section from their "Positions Available" listing. This is a monthly service to us, for you.

BIRD KEEPER...responsible for care and maintenance of expanding bird collection. Requires minimum of two years' paid professional avicultural experience. Formal education helpful but not mandatory. Salary \$11,900 per year, plus benefits. Send application to Dale Stastny, Deputy Director, Audubon Park & Zoological Garden, P.O. Box 4327, New Orleans, LA 70178.

EDUCATION TRAINEES...two temporary positions available. Must have bachelor's degree in appropriate field (education, biology, zoology, marine science), college course work in biology and experience working with children. Salary \$11,00/year. Send resumes/applications by 1 December 1982 to Carol Ruppert, National Aquarium in Baltimore, Pier 3, 501 E. Pratt St., Baltimore, MD 21202. EOE.

CURATOR/MANAGER...Willowbrook Wildlife Haven, a nature wildlife exhibit and rehabilitation center. Management responsibilities include supervision of personnel, capital improvement projects, grounds maintenance, animal services, exhibits, and financial and budgetary programs. Desire applicant with Masters level in Zoology, Ecology, Wildlife Management, or similar, and 2 years of administrative experience. Salary \$20,604-\$29,618 plus benefits. Mail resume to R. Dan Gooch, Superintendent of Conservation, Forest Preserve District of DuPage County, P.O. Box 2339, Glen Ellyn, IL 60137.

SALES DIRECTOR...individual needed for supervising and coordinating production and sales of exotic animal diets. Must have background in zoo animal nutrition, and be able to communicate on a professional level with zoo directors, veterinarians and curators. Salary commensurate with ability and experience. Send resume to International Foods Co., Inc., P.O. Box 29345, Lincoln, NE 68529.

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### CORRECTION

In the July 1982 AKF under "Zoo News From Japan": Mac, the first captive-born gorilla in Japan was born on 29 October 1970 and hand-reared using artificial feeding and was NOT born due to artificial insemination as reported in the article. The error occurred due to a misinterpretation of the original translation sent in by author Yoshi. Yonetani. Our apologies.

In the August 1982 AKF under "Primate Predation Survey Results", Donna McCleney, Senior Zoo Keeper at the Ellen Trout Zoo, was inadvertently identified as Donna McCleary. Our apologies to Donna.



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Articles sent to *Animal Keepers' Forum* will be reviewed for publication. No commitment is made to the author, but an effort will be made to publish articles as soon as possible. Those longer than three pages may be separated into monthly installments at the discretion of the editorial staff. The editors reserve the right to edit material without consultation unless approval is requested in writing by the author. Materials submitted will not be returned unless accompanied by a stamped, self-addressed envelope.

Telephoned contributions on late-breaking news or last minute insertions are accepted. However, phone-in contributions of long articles will not be accepted. The phone number is (913) 272-5821.

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# Animal Keepers' Forum



*Dedicated to Professional Animal Care*

NOVEMBER 1982

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This month's cover features Frank Kohn, AAZK Research Advisor and "Bo", a binturong at the NZP Conservation/ Research Center in Front Royal, VA. Frank is a keeper at Audubon Park & Zoological Garden in New Orleans. The drawing was done by Rebecca Conway, wife of AAZK Legislative Coordinator Kevin Conway. Thanks, Rebecca!

# Scoops and Scuttlebutt

## EDITORIAL STAFF PLANS FOR EXPANDED CONFERENCE ISSUE

The December issue of Animal Keepers' Forum will once again be a greatly expanded edition which will include the proceedings and papers presented at the National AAZK Conference in Toronto in October. It will be sent to all current members, so don't let your membership lapse and miss this special issue.

## MEMBERS REMINDED TO NOTIFY NATIONAL OF ADDRESS CHANGES

All members are reminded that it is very important that you notify the National Headquarters of AAZK when you have a change of address. It is vital that you do this as soon as possible to avoid having your AKFs returned "address unknown". National must pay 25¢ postage due for each returned issue. If you have not notified National on an address change and we receive your AKFs postage due, we cannot mail you out another copy free of charge. There will be the standard \$1.00 charge for all additional copies sent out due to a members failing to notify us of a new address.

## 'TOOTH TALK' COLUMN NEEDS INPUT

All members are reminded that zoological dental consultant Dr. Edward V. Shagam has offered to answer keeper's questions concerning the dental health and/or problems of the exotic animals in their care. Questions should be submitted directly to Dr. Shagam, 127 High Street, Mount Holly, New Jersey 08060. They will be answered via his column in the Forum. Please include specific scientific name with your questions. We urge all keepers to take advantage of Dr. Shagam's offer to share his expertise with us.

## AHT JOURNAL SEEKING ARTICLES

New Methods, The Journal of Animal Health Technology, is seeking articles of interest to Animal Health Technicians. New Methods is a monthly, nationally distributed journal published by and for AHTs. If you have an experience, case history, theory, political view or amusing anecdote to share with others in their field, contact Ronald S. Lippert, P.O. Box 22605, San Francisco, CA 94122. Or call (415) 664-3469 for further details.

# Births & Hatchings

## DALLAS ZOO.....Beth Lasher

The following are the births and hatchings at the Dallas Zoo for the month of September 1982: Mammals - 4 Patagonian cavy, 1.0 Dama Gazelle, 1.0 Lowland gorilla, 1.0 Klipspringer, 0.1 Blackbuck antelope, 0.1 Slender-horned gazelle (DNS), 0.1 Greater kudu. Reptiles - 2 Pueblan kingsnakes, 3 Jalisco kingsnakes, 3 Central American kingsnakes.

## BROOKFIELD ZOO.....John S. Stoddard

September 1982 births and hatchings at the Brookfield Zoo include: 0.0.2 Arrow poison frogs, 0.0.5 Cuban anoles, 0.0.1 Turquoise tanager, 0.0.1 Blue-grey tanager, 0.0.2 Flame-faced tanager, 2.0.4 Mongolian jird, 1.1 California mouse, 0.0.3 African grass mouse, 0.0.6 Spiny mouse, 0.0.7 White-toothed shrew, 0.0.2 Goeldi's marmoset, and 0.3 Collared peccary.

On 19 August, two Guinea baboons were born on Baboon Island. This unusual event is the first twin birth at Brookfield since 1968. The mother and both youngsters are doing well.

## CINCINNATI ZOO.....Rick Heithaus

The summer of 1982 saw the birth of two large mammals at the Cincinnati Zoo Elephant House. On 16 August, a male Masai giraffe was born to Fred and Georgette. Unfortunately, Georgette died shortly after the delivery due to complications during the birth. It was her second offspring, Georgette having been born at the zoo in 1976. The baby "Hugo", adopted by the Cincinnati Tall Club and named after their logo, is being bottle fed and hand-raised. After seven weeks he has grown five inches and gained approximately 100 pounds and is doing fine.

On 29 September a female black rhinoceros was born at the Elephant House. It was the third offspring for the mother, Baruti, a 13-year-old from the wild, and the eighth for the father, John, a 28-year-old who came to the zoo from Germany in 1957. The baby weighed about 60 pounds at birth and the mother is taking good care of her. The gestation was 15 months and 2 days; 29 days shorter than her last gestation. The zoo has another breeding pair of black rhinos kept in the African Veldt area. This pair is expecting their third offspring early next year.

Both offspring were born during the 16-month renovation of the Elephant House which presented some minor problems that were worked out. Christmas will bring us another giraffe from our other female Masai and possibly births from both our pygmy hippos.



# Keeper's Alert

Keeper Education Committee Update

44/23 + 2 and 2+ 2 + 2 = ? (see solution at the end of this article)

By  
Judie Steenberg  
Keeper, Woodland Park Zoo, Seattle, WA

The Toronto AAZK Conference proved to be an excellent forum for the subject of Keeper training and education. Questionnaires, a workshop and a committee meeting all received good attention, and more importantly, generated good participation.

The results of the questionnaire given to delegates helped identify the areas where the Committee can provide the most assistance to Keepers and their respective zoos. The majority of the zoos represented at the conference did not have formal Keeper training programs although some do have monthly meetings or lectures on general zoo subjects. Lack of interest, time and commitment required and limited staff were about equally indicated as reasons for most zoos not having a program.

There was an overwhelming "YES" to the question: "Do you think AAZK should become more directly involved in Keeper education?" It also became evident that basic zoo keeping techniques and communications/dissemination of information were the two areas delegates felt would be the most useful areas on which to concentrate.

An interesting side-light was that 75% of the questionnaires returned indicated that the respondent or someone from their zoo had submitted material to AKF...a clean indication of the importance of our publication as a means of communication.

Finally, 12 delegates signed up to work on the Keeper Education Committee. We now have a total of 17 AAZK members willing to concentrate on the subject of Keeper Education. There will be more on the Committee next month and specific information on how you can help out.

A 1½ hour workshop at which current programs, questionnaire results and anything anyone wanted to talk about regarding Keeper education concluded with the following guidelines for the committee:

- to review existing programs in depth
- to develop audio-visual aid supplements to the AAZPA Animal Husbandry Manual
- to assemble reference information and materials

Chris Parker, Metro Toronto Zoo, who recently developed a training program for their use gave a review of their approach. Douglas Richardson, Howlett's Zoo Park, England spoke about the British correspondence course "Zoo Management". Additional discussion centered on what AAZK could develop without duplicating work already done. It was generally agreed that it isn't possible to put together a program that will suit the needs of all zoos. Specific topics that could be covered in workbooks and/or audio-visual aids received good attention.

We did not lack for ideas, nor for members willing to work on them. During the next three months the Committee will concentrate on:

- assembling and reviewing materials from existing programs, Chris Parker, Metro Toronto Zoo, Canada, will coordinate.

## KEEPER EDUCATION UPDATE, continued

- planning audio-visual and printed matter on Keeper Safety, Wayne Buchanan, Woodland Park Zoo, will coordinate.
- researching bibliographies and other reference materials, Jenny Rentfrow, 1951 Eden Rd., Mason, MI 48854 and Liz "Mary" McLaughlin, Roger Williams Zoo, will be compiling this data.

This is a starting point and membership input is welcome. Please direct your correspondence to the personnel directly responsible for the area in which you are interested. As of 1 January, 1983, we will begin to produce the workbooks, audio-visuals, reference lists etc. as a result of the research being done from now till then. Don't delay in expressing your ideas...sit down right now and write them down..no need to wait until you can get to a typewriter.

We're on our way to real progress in the area of Keeper Education. The results of a year-long effort will be presented at the Philadelphia Conference in September 1983. That's really not a very long time from now. If you are called upon for information, please respond promptly. However, if due to other commitments, you can't be of help, just say so.

All in all, it's time to get involved with Keeper Education...for ourselves, our zoos and those who will follow us.

Solution: 44 zoos from 23 States + 5 Provinces, and 2 Keepers each from 2 European countries in attendance plus contact with the China-U.S. Scientific Exchange and a new Israeli Zoo = A very successful International Conference.



## **Coming Events**

### SYMPOSIUM ON BREEDING BIRDS IN CAPTIVITY

February 24-27, 1982

Universal City, CA

Sponsored by the International Foundation for the Conservation of Birds in honor of Dr. Jean Delacour at the Sheraton-Universal Hotel. For information and registration forms, contact Gary Schulman, Delacour/IFCB Symposium, 11300 Weddington St., North Hollywood, CA 91601. (213)980-9118.

### WILDLIFE REHABILITATION SYMPOSIUM

March 23-27, 1983

Naperville, IL

Sponsored by The National Wildlife Rehabilitation Association; The Friends of The Furred and Feathered; and the Business and Professional Institute of the College of DuPage, and Treehouse Wildlife Center. Keynote speakers: Murray Fowler, D.V.M., The Univ. of California, Davis and Katherine McKeever, The Owl Rehabilitation Research Foundation. Pre-registration \$30 per person before Dec. 1; \$40 per person after Dec. 1. \$10 extra for banquet which is optional. Make check payable to: Treehouse Wildlife Center. Indicate Institutional affiliation, if any. Limit 600 registrants. Mail registration to: "Symposium '83, Treehouse Wildlife Center, RR #1, Box 125E, Brighton, IL 62012. Sessions on general philosophy, veterinary medicine, wildlife biology, captive management and conservation education.

## GRASS ROOTS GENETICS . . . . Part Two

### GENETIC COMPLICATIONS

By  
Dora Jacobs, Keeper  
Rio Grande Zoo, Albuquerque, NM

Characteristics of living things are passed from one generation to the next by genes. Each parent contributes half a set of genes to the offspring. Dominant genes express themselves in the offspring and recessive genes are masked by any dominant which accompanies them. If we know an animal's genetic composition, we can plan breeding to produce a superior offspring. It is knowing this genetic composition that is so difficult. If all genes were either dominant or recessive and that was all, we could do successful breedings as a simple mental exercise. Unfortunately, however, not all heredity occurs by simple dominance. There are a number of mind-boggling mechanisms which can occur instead, or even also, for that matter.

The simplest complication to understand, although not the most common in occurrence, is mutation. Mutation is simply the sudden changing of a gene into a different gene. Mutation can be caused by radiation, chemicals, extreme temperatures, or any kind of physical deterioration such as bruising. Although there has been much publicity given to nuclear pollution as a cause of genetic damage, it has been suspected that caffeine consumption and the cooking of sperm by men who wear tight pants probably are responsible for more human mutations than radiation. All variations within a species had to have originally arisen from some kind of mutation.

Some mutations never succeed in infiltrating a species for the simple reason that they are dominant lethals. A lethal gene causes death, either before, shortly after, or a long time after birth. A dominant lethal gene causing death before birth never gets beyond the animal it mutated in, because all of that animal's offspring are spontaneously aborted. But those with delayed death may breed before dying and pass the problem on. Recessive lethals, of course, show up sporadically from breedings of healthy animals. Especially is the lethal nature of a gene is not recognized, people may intentionally breed animals with lethal genes because of their other desirable characteristics. There is a lethal recessive gene in Irish Dexter cattle called the *chondrodystrophia fetalis* or "bulldog" gene which causes a high incidence of spontaneous abortion, but the cattle are so good if they are alive that breeders are making the required enormous effort and sacrifice to breed the problem out.

Some genetic characteristics are sex-linked. That is, they are only, or mostly, expressed in one sex. Sex itself is caused by a difference in the size and shape of one pair of chromosomes, where the genes are located, which leads to a lack or abundance of certain hormones and characteristics in the animal's body. In early pre-natal development, there is no visible difference between male and female individuals. Even human beings don't look any different until the fifth week of development. Occasionally chemical mistakes happen which causes something to develop the organs of both sexes. Sex chromosomes are called X for the large one and Y for the small one. In birds, a male is formed by two X chromosomes. In mammals it is the opposite, with a female formed by two X chromosomes. The odd chromosome is in both cases dominant, and gets expressed whenever it shows up. Since one parent always has two of the same kind of chromosome, the

## GENETIC COMPLICATIONS, Continued

only genetic possibilities are homozygous recessive and heterozygous dominant.

Sex-linked characteristics can be carried on either chromosome. Usually the hormones produced by one chromosome enhances them while the other inhibits them. Let us use mammalian examples to simplify discussion, since a female mammal is XX and a male mammal XY. The antlers on deer is a sex-linked characteristic. Only the male develops them in normal deer; double-dose female hormones suppress their development. Color differences in birds are often sex-linked. Often, other characteristics which are not always present tend to show up more in one sex than another, because they are sex-linked. Color-blindness in human beings occurs more in males than females, and the lethal bleeding disease, hemophilia, is also more common in human males.

There is a phenomenon in genetics called "modifiers". In this case, the effect of a gene is altered or completely suppressed by the presence of a different gene, separate from the pair that directly causes the characteristic. This kind of behavior can be hard to pin down because the statistics don't come out right for plain dominance, but it can take a lot of time-consuming and expensive breeding before we catch on.

Modifiers can cause characteristics to be mixed, or suppressed, although it is genetically present and can be passed on to the offspring. This is the case with seemingly white mice who, when bred to each other, give birth to only black babies. The truth is that those mice are not genetically white, but pale cream, which is black with a modifier traveling with it. When two such mice are bred to each other, the modifier is overruled and the offspring throw back to black.

Multiple alleles, or more than one set of genes, control several characteristics in animals. Hair color, tail length, standing height, and blood type are a few.

There are other words used to describe various deviations in the mode of genetic inheritance, but they usually come under one or more of those basic categories. As our understanding grows, with new scientific discoveries being made all the time, some of the complications are made clearer and simpler. The fact still remains that a parent can only pass on what genes it has in its own body, and any animal got half of its genes from one parent. Bearing those facts constantly in mind can help us wade through the confusion toward understanding the genetic makeup of the animals we see.

The next and final installment of this series will deal with tracing pedigrees and planning breedings.

*(Editor's note: The preceding article was reprinted from GOOD GNUS, the newsletter of the Rio Grande Zoo AAZK Chapter, Vol. 5, No. 2, August 1982 with permission of the author.)*



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## THE BRONX ZOO'S COUP D'ETAT

By  
Richard J. Passaro  
NYP Conservation and Research Center  
Front Royal, VA

There are some drastic changes about to happen to the zoos in the greater New York area. Approximately two years from now, under the supervision of the New York Zoological Society (Bronx Zoo) plans to begin renovation of all the major zoos of the area (excluding the Staten Island Zoo) will become a reality. According to the plan the Central Park Zoo in lower Manhattan, the Prospect Park Zoo in Brooklyn and the Flushing Meadow Zoo in Queens are all slated to be overhauled and newly staffed.

The first undertaking on the agenda is that of the Central Park Zoo. If all goes well construction is scheduled to begin in 1983. Richard Lattis, who is currently Curator of Education at the Bronx Zoo, has been named Director of the Central Park Zoo and is the overseer of the entire project. Lattis was also responsible for the renovation and concepts behind the Bronx Zoo's popular new Children's Zoo. The ideas that he and his staff have developed for the Central Park Zoo sound, at the very least, intriguing. What they tentatively plan to do is to create a tropical habitat at one end of the zoo and a polar habitat at the other. The exhibits will feature concepts along the ecological and behavioral lines which are characteristic of each environment. The polar exhibit will house penguins and the Central Park Zoo's extremely cramped polar bear, as well as boasting artificial snow year-round.

Between the two exhibits are plans to erect an "Intelligence Garden". The title of this exhibit signifies just what it's purpose is to be; a means of education in a beautiful garden-like setting. The idea was taken from a zoo designed in China by Emperor Wen Wang in 1100 B.C.

Following the completion of the Central Park Zoo project, the Society plans to completely renovate the Prospect Park Zoo. This plan includes the removal and replacement of antiquated cages and exhibits with newer and more modern methods of animal exhibition and care. The number and kind of animals to be exhibited is also going to be increased.

Along with the coming of this new zoo will be the security of the New York Zoological Society. Not only will the zoo bring much needed jobs to that area but, along with its increased staff, attendants and security personnel will, hopefully, come the crowds. The community is hoping that this will make the now usually vacant park safer for joggers, pedestrians and children. Unfortunately, sad but true, there is safety in numbers.

The final undertaking of the project will be that of the Flushing Meadow Zoo. Although only five acres in size, the Society remains undaunted with big plans. Here are plans to create the world's finest, most innovative children's zoo ever. Exactly how they plan to better the recently completed New Children's Zoo still remains unknown. Perhaps they plan to take the concepts from their own Children's Zoo and expand upon them. Maybe the participatory aspects of the exhibits will be increased. Whatever they have up their sleeves, I am sure it will increase the already fine impression we have of the New York Zoological Society and the Bronx Zoo.

As you can see there are alot of changes in store for the New York area's zoos. If you are planning a trip in the next couple of years perhaps you will be able to visit one of the annexes of the Bronx Zoo, that is, if all goes well.





THE DEVELOPMENT OF REPRODUCTIVE  
BEHAVIOR IN GOLDEN EAGLES  
(*Aquila chrysaetos*)

*Bird Calls*

By  
B. Wayne Buchanan  
Woodland Park Zoological Gardens  
Seattle, WA

The following is a summary of the six-year reproductive history of a pair of Golden eagles (*Aquila chrysaetos*) at the Abilene Zoological Gardens in Abilene, TX. It is of interest not only because of its success, but also because it demonstrates the gradual development of a complete reproductive cycle. This development also brings to light some important points of consideration for captive reproduction.

History

In March 1976 the eagles were introduced in a new chamber in the form of an elongated pentagon with a sloping roof. It measured (approximately) 40 feet long, 20 feet wide and 20 feet high at the rear, and 10 feet wide and 15 feet high at the front. A nest platform was constructed in the rear and perches at various heights were placed throughout the enclosure. The chamber is not accessible to the public.

The male was placed in the chamber first to give him the territorial advantage when the female was introduced. It was hoped this would offset her size advantage in the event of aggression. There was minimal aggression when the female was introduced. It was noted that the female spent considerable time at the nest site.

1977 January: The female was observed soliciting the male, but he did not respond. No other interactions of note were observed this breeding season, but the two did develop a greater tolerance for each other.

1978: January through March: All activities continued to intensify well beyond levels observed in previous years. Nest building activity was the most noticeable increase with a very well defined nest cup visible for the first time. The female was observed carrying food to the nest several times. This indicated the nest area was becoming a focal point for behavior.

28 March: The female was observed standing in the nest, wings drooped, staring toward her feet and giving short "chup" calls. The male was very restless. The first food caching was also observed.

29 March: Observed the male in the nest with the female standing quietly next to him. Both birds seemed oblivious to the activities around them. Later in the day, there was opportunity to check the nest, whereupon an egg was found.

2 April: A second egg was found in the nest. The male was a very intense incubator spending much more time on the eggs than anticipated. The caching of food continued; both birds became quite aggressive toward humans. Both eggs proved to be infertile. They were incubated for more than twice the normal incubation period with the female doing a larger percentage of the incubation in the latter stages.

1980: 1 January through 22 February: Nest construction continued during this time.

23 February: First attempted copulation was observed.

24 February through 28 March: Numerous copulation attempts were observed - all were awkward but improving. The male was very apprehensive and cautious.

29 March: The first successful copulation was observed. The relationship had progressed steadily and now seemed noticeably smoother with more time spent in close association.

1 April: First egg observed in nest.

5 April: Second egg was observed in nest.

4-9 April: Third egg was observed in nest. Again, all eggs proved to be infertile and were incubated long past their hatch date.

1981: 25 February: The first copulation attempt was observed; there were few preliminaries.

27 and 28 March: Numerous complete copulations were observed.

30 March: First egg observed in nest.

3 April: Second egg observed in nest.

10 May: One eaglet observed in nest. It was believed to be from the first egg laid.

14 May: Eaglet was missing from nest. It was believed to have died 13 May. Ample food was present at nest, yet no feeding attempt was observed. The female was apparently too broody.

1982: 28 January: The first copulation attempt observed - it was awkward and unsuccessful.

20 February: First successful copulation observed.

27 March: First egg observed in nest.

31 March: Second egg observed in nest.

3 April: Third egg observed in nest.

9 May: Probable date of hatching of egg #1

10 May: Probable date of hatching of egg #2. Egg #3 did not hatch.

19 May: The younger eaglet was pulled because of aggression from the older eaglet.

8 June: Older eaglet was pulled.

The two eaglets were released as part of a program to re-establish Golden eagles in North Carolina.

#### Discussion

It is necessary to diverge for a moment to discuss the term "reaction chain". It is defined as follows by Tinbergen (1951), "Each reaction of either male or female is released by the preceding reaction of the partner." Although this term is not widely used today, the principal is probably familiar to many keepers. One may be more familiar with terms like sign stimulus, releaser, stimulus/response, or behavioral sequence. All of these deal with the same concept. It is important to understand that reaction chains are what one might call the functional unit of behavior. For example, a complete reproductive cycle is composed of several specific reaction chains, occurring in specific sequence. It is also important to understand that, as the definition implies, a reaction chain has one specific starting point, and when halted in progress, it can not re-start where it stopped. It can re-start only at the beginning.

The question arises as to why these eagles, both sexually mature when first placed together, required six years to complete the development of the reproductive cycle. Captivity imposes certain problems on all breeding projects: stress of confinement, habituation to new enclosures, pair bond formation with little or no choice of mate. All of these require time to overcome.

My own observation in 1979 indicated the eagles were quite at ease with their general situation, their enclosure, and each other. These conclusions were reinforced by the fact that the eagles were engaged in reproductive activity.

In the course of attempting to observe said activities, I noted that my appearance would momentarily cause their attention to focus on me. This was not a stress situation, but rather a distraction. If the eagles were in the midst of a courtship sequence, the distraction of my appearance was sufficient to disrupt the sequence in progress. Once disrupted, it could re-start only at the beginning.

Although the enclosure is off display, it is located within the zoo service area. In the course of a day keepers and vehicles pass near the enclosure many times. My observations indicated this daily traffic acted to repeatedly distract the eagles and therefore break any reaction chain in progress.

## THE DEVELOPMENT OF REPRODUCTIVE BEHAVIOR IN GOLDEN EAGLES, Continued

It is also worth noting how the observed breeding behaviors became compacted into a smaller portion of the calendar year beginning with 25 February 1981.

Last, despite there being no change in management technique each breeding season, the eagles were able to overcome whatever inhibition had halted them the previous season, and proceed further along the reproductive cycle. A gradual building of a complete reproductive cycle is clearly shown. Newton (1979) states that this same progression has been noted in other raptors, both captives and wild, though it usually occurs during the sub-adult stage of life.

### Conclusions

The primary conclusion of this paper is that, although rather extended in time, the gradual development of the complete reproductive cycle of these eagles followed a normal pattern. Allowing sufficient time for this normal behavioral development is a consideration that should be made for any breeding project.

This case also draws three secondary conclusions. First, I strongly believe the compacting of reproductive behaviors into a shorter time span is indicative of a strong pair bond. Once this is achieved the reproductive reaction chains not only appear to proceed more smoothly, but also to become somewhat more abbreviated.

Second, the repeated distraction of the eagles by daily keeper activities was clearly a factor in slowing the development of a complete reproductive cycle. This also should be a consideration made for any breeding project.

Third, it is very advantageous for a keeper to understand the concept of reaction chains. It greatly increases the likelihood of identifying proper reproductive behavior and/or factors inhibiting proper reproductive behavior. However, this becomes a near-impossibility if one does not take, or is not allowed to take the time to observe the animals.

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Tinbergen, N., The Study of Instinct, New York & Oxford, Oxford University Press, 1951.



## Information Please

Persons having experience with captive breeding of Ruffed Lemurs (Lemur variegatus) are urged to contact the Calgary Zoo. We are interested in factors that improve chances for mother-rearing. A description of cage environment, the individual animals in it, and any procedural considerations would be appreciated. Please contact: Robert R. Peel, Calgary Zoological Society, Box 3036, Station "B", Calgary, Alberta, CANADA T2N 1Y2.



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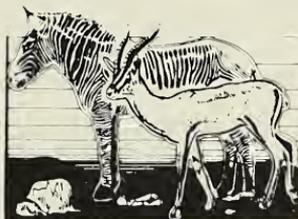
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# Keeper's Alert

## HELP SAVE LA PLANADA!

The World Wildlife Fund-U.S. needs your help in their efforts to save a precious and irreplaceable part of our world. It is called La Planada, a 3,705 acre area of rain forest located in Columbia, South America.

Rain forests, the oldest and most complex ecosystems on earth, are disappearing at an alarming rate. Some scientists think that all the world's rain forests may be gone before the year 2000! Rain forests cover only about 6% of the earth's land mass yet they contain over half of all the species of plants and animals now known to exist and quite possibly many more which are as yet undiscovered and unstudied. Columbian rain forests are home to more species of birds than any other nation. Large expanses of Columbian rainforests include areas believed to be "Pleistocene refugia"--small areas where the rain forest ecology survived through the Ice Age. La Planada is one of these rare places.

A furniture manufacturer has shown considerable interest in buying La Planada for commercial purposes. For the moment, however, World Wildlife Fund has secured the option to buy. Now, they need to raise the remaining monies needed for the purchase price. They already have \$50,000 in hand but need to raise an additional \$72,000 by December 31, 1982. The World Wildlife Fund hopes to secure the land and work in cooperation with the Columbian government in establishing a wildlife preserve for the many endangered species of the rainforests. Among these are the amazing paradise tree snake that "swims" through the air in 160-foot glides, the Spectacled bear (the only bear native to South America), two-toed sloths, anolis lizards, kinkajou, coatimundi, as well as thirteen species of birds that are found only in La Planada.

The Sedgwick County Zoo Chapter in Wichita, Kansas has purchased two acres of La Planada for the World Wildlife Fund. Your AAZK Chapter, your Zoological Society or you as an individual can also have the opportunity to help in this effort. It is a gift you can give yourself that you can't touch, smell, hear and may very well never see...but it is an investment on your part for the future of all mankind and for all creatures great and small. If you can help, fill out the form below and send it with your tax-deductible contribution to World Wildlife Fund-U.S. at the address given.



URGENT: DEADLINE 31 DECEMBER 1982

Yes, I would like to help World Wildlife Fund save endangered species in La Planada and around the world. I enclose my gift of:

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\$ 36 1 Acre

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1601 Connecticut Avenue NW,  
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THE ROLE OF THE MODERN ZOO  
IN THE PRESERVATION OF SPECIES

By  
Steve Clevenger  
National Zoological Park

The modern zoological institution looks upon itself as having four functions: conservation, education, research and recreation.<sup>10</sup> The priority of these functions has changed through time--ancient zoos were the playthings of monarchs and the zoos of the 19th century were recreational menageries in the midst of the recently industrialized cities.<sup>3</sup> Man's acceleration of the decline of the natural environment and the decrease in diversity of species necessitates a change in priority of these functions. Traditionally, zoos have been consumers of wild species, due to the easy availability of animals from the wild. Man's effect in decreasing wild populations has likewise decreased the potential for widespread importation of wild-caught individuals. The continued survival of many wild populations and zoos themselves thus depends on captive propagation and the education of the general public in the worth of diverse natural populations of organisms. Prior to the last 10 years or so, zoo's dedication to the conservation of species has been one primarily of word rather than deed. In order to gain a perspective of the potential for successful conservation efforts by the zoo, let us examine the captive propagation "successes" of the past and their effects, the long-range impact that zoos might have on extinction of all species, and what the modern zoo can do to further the preservation of species.

While much of the conservation work done by zoos in the past has been rhetorical, several examples from history can show us the value of captive propagation in the preservation of threatened species. The most classic example is that of Pere David's deer (*elaphurus davidianus*). This species was first described in science by Abbe Armand David, a French missionary who discovered a herd in the Imperial Hunting Park south of Peking in 1866.<sup>4</sup> These animals had become captives during the Shang Dynasty (1766-1122 B.C.) and captivity foreshadowed their extinction in the wild. Thus, when discovered in captivity, Pere David's deer had been extinct in the wild for over 3,000 years!<sup>3</sup> Soon after this, *E. davidianus* made its way to zoos in the west, and none too soon. A flood in 1894 destroyed much of the wall surrounding the preserve and most of the animals escaped and were killed by starving peasants. A large part of the remaining herd was lost during the Boxer Rebellion and the last remaining animals in China died in Peking in 1921.<sup>3</sup>

Fortunately, the Duke of Bedford had the foresight to establish a herd of animals on his estate in the southern part of England. From this nucleus herd of 18 animals in 1900, the herd had grown to 64 by 1922. In 1964, the London Zoo sent a group of four animals to the Peking Zoo, re-establishing the species almost 50 years after it had disappeared from its native land.<sup>3</sup> The current world population of Pere David's deer, according to *International Zoo Yearbook* is 800 animals in 76 collections.<sup>2</sup> Pere David's deer is a testimony to the ability of captive populations to serve, in the words of William Conway of the Bronx Zoological Park, "as last redoubts for species which have no immediate opportunity for survival in nature."<sup>7</sup>

Another prominent species which may exist only in captivity now is Przewalski's horse (*Equus przewalski*), the last surviving species of

wild horse. It made its way into captivity in the 1940s and the last reliable sightings in the wild were in the late 1960s.<sup>2</sup> The captive population, in 1973, had grown to 206 animals in 42 zoos, although the herds were considerably inbred.<sup>3</sup>

The European bison (*Bison bonasus*) likewise has been a victim of European man's encroachment on its habitat and the widespread destruction of World Wars I and II. The International Association for the Preservation of the European bison and a base herd of animals in the Berlin Zoo provided the base for introduction and on-going re-establishment of these animals in eastern Europe and the Soviet Union. The American bison (*Bison bison*) is kept alive in a similarly controlled setting.<sup>2</sup>

While these cases for captive propagation are successes, the long-range potential for positively affecting conservation of all endangered species by zoos is limited by several factors. The major factor in this respect is a limited captive holding capacity. This is compounded by the zoo's need to display a wide variety of animals to fulfill the function of public education.<sup>8</sup> The logistical demands of most institutions limit the number of animals which can be maintained. Geneticists have established that for the more or less permanent captive survival of a species a total population of 100 or more individuals must exist, at least half of which are captive-born.<sup>3</sup>

Another factor detrimental to captive propagation is that not all organisms adapt well to captive situations, much less reproduce well in them. Animal husbandry directed toward propagation can often be a frustrating and futile experience.<sup>9</sup>

In working with relatively small captive population sizes, one other problem is the potential for evolutionary change in captivity. This is seen especially in the previously mentioned Przewalski's horse. In the largest captive herd (in the Prague Zoo, now in its fifth to eighth captive generation, there has been a reproductive change. Foals are often now born outside of the sharply defined foaling season in the wild.<sup>3</sup> This could cause severe problems in the event that reintroduction were to be attempted into the animals' original habitat.

Zoos, despite the logistical limitations imposed upon them, can do much to continue to assure the preservation of many species in perpetuity. This may be accomplished by: continuing to accelerate the pace of captive propagation efforts to several ends; management of large populations to offset the deleterious effects of inbreeding; and increasing efforts to educate the lay person on the intrinsic worth and importance of wild diversity.

Zoo's efforts toward reproducing animals are directed toward three ends.<sup>2</sup> The first and most obvious is to relieve (and eventually eliminate) pressure on wild populations. Self-sufficiency in producing stock for exhibition eliminates one more factor endangering wild populations. This is being done in many respects today. The wild population of snow leopards (*Panthera unica*) is approximately 500; the world captive population of 190 animals is composed of 145 captive-born animals.<sup>6</sup> Secondly, captive propagation must be directed toward restocking depleted wild populations. With the exponential increase in the number of extinctions yearly,<sup>1</sup> and the concurrent increase in human population, this becomes increasingly difficult with the passing of time. Toward this end, zoos and all concerned individuals should work closely with conservation organizations to

assure preservation of critical habitat for all species. The third aim of captive propagation should be to provide a last resort effort to save and propagate endangered species. This has been done in the past with such diverse species as the European bison and the mongoose lemur (*Lemur mongoz*).<sup>3,4</sup>

Zoos may also, by cooperative management, increase the size of captive populations to offset and decrease the deleterious effects of inbreeding. Several specific management schemes may be used to accomplish this goal. One of the most common is the "breeding loan" - an agreement between two institutions for transfer of an animal for purposes of propagation without transferring ownership of the animal. If successful breeding occurs, the offspring are divided between the two participating institutions in a previously agreed upon sequence.<sup>4</sup> This and other forms of cooperative management are a relatively recent phenomena, one that the worldwide disappearance of species (at a rate of three extinctions per day in 1980<sup>5</sup>) has necessitated.

Additional aids to decreasing potential for inbreeding are studbooks and the ISIS computer program. Various zoos around the world (usually those which "specialize" in a particular species) maintain studbooks or genealogies for the worldwide captive populations of those species. Some examples are: snow leopard (Helsinki Zoo), Przewalski's horse (Prague Zoo), Pere David's deer (Whipsnade Zoo), and golden lion tamarin (National Zoological Park, U.S.A.). The studbooks allow animal managers to examine the background of potential breeders to determine if specific animals are related. The American Association of Zoological Parks and Aquariums (AAZPA) also sponsors ISIS (the International Species Inventory System), a computer program which likewise provides access to inventories of members of virtually all species in the country. This source is used for assessment of potential inbreeding problems and pairing of single animals.<sup>2</sup>

Dealing with animals is only half of the zoo's potential for contributing to the preservation of species. To be effective in preserving species, the zoo must continue to educate the public. The zoo must be a common meeting ground for the human animal and wild creatures. It should function not only to teach facts, but also attitudes.<sup>2</sup> There is clearly a strong need to increase people's awareness of the roles which all species play, and of their intrinsic worth as well as practical value to man. Instilling the conservation ethic in the developing generations may well be the single determining factor in whether any species habitat is preserved in the future.

The task in preserving natural diversity of all species is a large one and the zoo can be a driving force in this preservation. By decreasing the flow of animals into captivity, wild populations will be allowed to flourish where habitat remains. By establishing self-sufficient captive populations, the survival of some species will be assured regardless of the effect of man upon the environment. By educating the public, the zoo can actively teach attitudes which recognize the practical and intrinsic aesthetic value of all species. Diversity of organisms, in spite of its alarming decline in the past 50 years, is a rare and delicate gift delivered to us by our forebearers. Only with a sense of dedication and cooperation between the zoos of the world, may this legacy be passed on to succeeding generations.

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(Editor's Note: This article originally appeared in ZOOSOUNDS, the bi-monthly publication of the Oklahoma Zoological Society, Volume XV111, Number 4, August 1982. The author, Steve Clevenger, recently assumed a new position at the National Zoo in Washington, D.C. and submitted the article for publication in AKF. It is reprinted here with his permission and that of the editor of ZOOSOUNDS.)



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## SEAL DAY IS MARCH 1, 1983



The International Day of the Seal, an annual celebration of seals and seal conservation, will be held March 1, 1983. This worldwide event focuses on public awareness and public involvement with seals and sea lions and the issues affecting them. Schools, colleges, civic groups, and conservation organizations will be among those throughout the U.S. and the world who will be participating. Trainers and keepers and their zoos and aquariums should be prepared to help observe this event with special presentations and publicity.

The Seal Rescue Fund, a Washington, D.C. based conservation group and one of the organizers of the International Day of the Seal, will have materials available at no charge for distribution on Seal Day by zoos and aquariums. In addition, they have prepared information sheets detailing how to organize Seal Day events and how to get press coverage. They will also have a poster available for sale.

For more information on the International Day of the Seal, contact Richard T. Tinney, Seal Rescue Fund, Center for Environmental Education, 624 9th Street, N.W., Washington, D.C. 20001.

# Legislative News

Compiled by Kevin Conway

## ELEPHANT AND RHINO EXPERTS PLAN SURVIVAL STRATEGIES

An international group of specialists met at Wankie in Zimbabwe (formerly Rhodesia) on 31 July 1981 to finalize action plans to conserve elephants and rhinos on the light of loss of habitat and fears that recent exploitation, especially of rhinos, has been excessive. The weeklong meeting was the climax to several years of intensive study of the situation confronting elephants and rhinos in Africa, and the international trade in ivory and rhino horn. The surveys were sponsored by the International Union for Conservation of Nature and Natural Resources (IUCN), World Wildlife Fund (WWF), the New York Zoological Society (NYZS), and the US Fish and Wildlife Service.

### African Elephants

Early assessments during the survey of African elephants (*Loxodonta africana*) had indicated that there were probably at least 1,300,000 elephants in Africa—a figure which has been widely quoted. As a result of later surveys, the specialists concluded at Wankie that the total African elephant population could range from a minimum of 1,100,000 to some 2,600,000.

The uncertainty arises mainly from the extreme difficulty of assessing elephant numbers in the vast and dense forests of the central African basin, which cover about one-third of the potential elephant habitat—much of it in Zaire. Some 600,000 elephants have been accounted for in detailed surveys—principally in savanna lands in eastern and southern Africa. In unsurveyed areas sample surveys made by air and on foot, combined with assessments of elephant numbers on extrapolation (using an index of elephants per square kilometre of suitable habitat) and informed guesses, led to the conclusion that there at least another 500,000 elephants, and possibly 2,000,000, to add to the 600,000 of the 'accurate' surveys.

High priority is being given to detailed surveying of the central African basin in order to arrive at a reasonably accurate figure.

Although overall numbers are high, it was agreed that Africa's elephants are declining in almost all of 34 countries in which they are still found, and especially where they are easily assessable to poachers or where their habitat is being taken over by expanding human populations. Reasonably stable African elephant populations exist only in Gabon, Ivory Coast, Malawi, Namibia, Nigeria, Rwanda, and South Africa, but they represent only a very small proportion of the overall population. In addition, Zimbabwe is notable for its 47,000 elephants whose population growth is kept in check by regular culling to protect the habitat.

### African Rhinos

The Wankie meeting found that the northern subspecies of the White rhinoceros (*Ceratotherium simum cottoni*) was in a critical situation, with fewer than 700 surviving in the wild—almost all of them in southern Sudan and northern Zaire.

The Southern White rhino (*C.s. simum*) which was thought to be extinct until a few were found in Natal at the turn of the century, have thrived under protection and there are now over 2,500 in South Africa and 300 in other countries of the region, apart from the considerable number sent to zoo in other parts of the world.

## LEGISLATIVE NEWS, Continued

Black rhinos (*Diceros bicornis*) have suffered massive declines in numbers in the past decade--for example, they have probably decreased by 90% in Kenya alone. It is estimated that there are now between 15,000 and 18,000 Black rhinos surviving in 18 countries, with the largest concentrations in Tanzania and Zambia. Almost everywhere they are being heavily poached for horn, which goes to the Yemen Arab Republic to make dagger handles, and to the Far East for medicinal use.

### Conservation Measures

The Wankie meeting recommended conservation measures based on the biological importance of various elephant and rhino populations, their conservation status, and the economic and national factors, such as human population expansion, impinging on them.

High priority was given to building up the small breeding herd of northern White rhinos at the Dvur Kralove Zoo in Czechoslovakia, and another group at San Diego. Protection of the wild survivors needs to be improved in the Garamba National Park in Zaire, and also in southern Sudan.

To save the Black rhino, anti-poaching measures also need to be stepped up and translocation undertaken of animals to protected areas from ones where they are exposed to poaching. Special attention was recommended for *D.b. longipes* in Cameroon and the Central African Republic, for *D.b. michaeli* and *D.b. ladoensis* in Kenya, and for *D.b. minor* in Tanzania and Zambia.

Recommended priorities for elephant conservation, in addition to the status survey in the central African basin, include the small desert herds in the Kaokoveld in Namibia and in the Gourma area of Mali; the fragmented and beleaguered forest populations on West Africa, and the savanna ones in Niokola Koba, Senegal, and the W National Park (which is divided between Niger, Benin, and Upper Volta)--also those of Selous in Tanzania, Garamba in Zaire, and in the Central African Republic.

The meeting also recommended that IUCN/WWF should make representations to governments and traders to achieve effective controls and conservation measures. It was agreed that the future of rhinos would remain in jeopardy as long as trade in their horn continued, and so special efforts were recommended to divert users in Yemen and eastern Asia to substitutes.

Great importance was given to achieving universal acceptance and effective application of the Convention on International Trade in Endangered Species of Fauna and Flora (CITES). It was suggested that their secretariat should be expanded.

Summing up the results of the Wankie meeting, the Chairman, Dr. David Cummings, Chief Ecologist of Zimbabwe's National Parks and Wildlife Department, said: "Although so much has to be done all over Africa, our meeting has identified a small set of priorities which requires strong and immediate action. There is no doubt that the Northern White Rhino in Sudan and Zaire is in an extremely precarious position. But the success in saving the Southern White Rhino shows that dedicated efforts now could certainly save the northern form from extinction.

"The Black Rhino is declining at an alarming rate, and the major focus for action is to arrest the trade in rhino horn, as well as to secure key Black Rhino populations in Tanzania and in the Luangwa Valley in Zambia.

LEGISLATIVE NEWS, Continued

"There will inevitably be a continuing reduction in the numbers of Africa's Elephants as a result of increasing human population and the demand for land. The key issue is to focus on conservation of elephants in a wide range of habitats throughout the continent. This is why we stressed the importance of the West African Elephants. Overall, careful thought needs to be given by African governments [as] to what land and habitat should be conserved before their options are closed."

The finalized action-plans are being presented to African leaders as the basis on which they can plan the future integration of conservation of wildlife resources with economic development.

"If the right decisions are taken and implemented now, Elephants and Rhinos can continue to play their traditional roles as sources of meat, ivory, and other products, as as part of the living culture of the people of Africa. The international community has a duty to help with funds and expertise", the Director-General of IUCN, Dr. Lee M. Talbot, declared. It is toward such ends that WWF/IUCN are continuing to strive.

---Peter F.R. Jackson in  
Environmental Conservation



"Getting There"

By  
Gary Lillo  
Animal Keeper, Topeka Zoo

Finally there comes an opening at the Zoo,  
And so you stand in line, 200 others and you.  
They give you a smile and paper and pen,  
They want your life history, other jobs and when.  
It takes you awhile then you tell them you're through,  
She takes them and says, "Don't call us, we'll call you".  
So, then all you can do is wonder and wait,  
Then after a few days it's all you can take.  
But then the phone rings, they say it's the Zoo,  
And tell you you've made it, to the interview.  
You jump for joy, that you've made it that far,  
But still 50 others are right where you are.  
Then the day comes to talk to the crew,  
The Director, the curator, Sr. Keepers and you.  
One by one they drill you on all that you know,  
You really get nervous, but try not to show.  
After what seems like a day, they say they are through,  
They give you their thanks and another, "We'll get back to you".  
Then it's back to the waiting, as you've done for so long,  
And you start thinking, maybe you said something wrong.  
Then finally a letter comes straight from the Zoo,  
They've made their decision, it turns out to be you.  
At first you can't believe it, you think it's a dream,  
But now you know you're part of the team  
Of thousands of others who had in their hearts  
The feeling you have to want to do your part.  
Now, you've been there awhile, you know all the ropes,  
You share feelings with others your dreams and hopes,  
And you don't mind all the shoveling, hosing and sweeping,  
For there's no greater satisfaction than those you get  
From animal keeping.

# Chapter

By Patti Kuntzmann  
Coordinator for Chapter Affairs

## St. Louis AAZK Chapter

Nationally recognized by charter in August 1982, our chapter hopes to earn from the national membership recognition, and association in reality as purposefully contributing a betterment to professionalism in our career field.

To date, we have 15 members and, in lieu of upcoming elections, the following gained temporary appointments:

President.....Randy Adolph  
Vice President.....Ann Day  
Treasurer.....Roger Clawitter  
Secretary.....Marla Haschak  
Corres. Sec'y.....Gary Michael  
Sgt.-at-arms.....Mike LaTurno

We look positively at our participation in this organization, and particularly to potentials in the future.

## Santa Barbara AAZK Chapter

The Santa Barbara Chapter's first fund raiser, a bake sale held at the annual Santa Barbara Zoological Gardens XI Zoo-B-Que, earned a profit of \$88.50. They are planning to raffle a Christmas tree and also hold a "Day With a Keeper" contest at the first of the year.

Officers elected at the biannual election in October are:

President.....Mary Dukes  
Vice Pres.....Fred Marion  
Secretary.....Julia Parker  
Treasurer.....Tori Delf

# News

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## Reptile Amphibian potpourri

### RED-EARED TURTLE TWINS

Ted Daehnke, Head Keeper  
California Alligator Farm

This summer our Red-eared Turtles (*Chrysemys scripta elegans*) produced twins, two turtles from one egg. I don't know how rare this is, but I haven't seen it reported in the past. The rarity of reptile twins in the literature may be due to the fact that only close observation of hatching or a careful count of babies and eggs would normally reveal the occurrence.

We have about 20 Red-eared turtles in an outdoor enclosure and each year collect 6 to 10 clutches of eggs for incubation. In 1982 we collected 6 clutches between 3 May and 16 May. Since we already have a surplus of Red-eared turtles, no effort was made to insure a high hatching ratio. The eggs were buried in moist peat moss in coffee cans and the cans were covered with plastic bags. The cans were then placed in a heated reptile house for incubation. Midway in the incubation period water was added to the peat moss, but otherwise they received no care.

TWIN RED-EARED TURTLES, Continued

On 30 July, I decided it was about time to find out how many baby turtles we had and started dumping the cans. All of the turtles I found had completely absorbed their yoke sacks and I felt that any eggs that had not hatched were not going to, so when I found a piped egg with a turtle inside I went ahead and opened the egg. Inside I found two turtles with their yoke sacks connected by a structure resembling an umbilical cord. The larger measured 25mm by 21mm and the smaller 14mm by 11mm. I cut the cord connecting the two turtles and there was a slight amount of bleeding from the smaller turtle, but none from the larger. The fact that the two turtles were connected suggests that they developed from one yoke rather than two yokes accidentally incased in one shell. The smaller turtle did not survive the first 12 hours, but the larger was doing fine at four weeks of age.



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EXTENT AND NATURE OF CIRCULATION

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TOTAL	1540	1680

I certify that the statements made  
by me above are correct and complete.

Signature and Title of Editor

*Michael D. Coker, Exec. Editor*

We are indebted to the AAZPA Newsletter for allowing us to reprint portions of this section from their "Positions Available" listing. This is a monthly service to us, for you.

KEEPER...position available 1 Jan. 1983. College training in animal-related field preferred. Experience in care and maintenance of wild and/or domestic animals desired. Responsible for care, feeding, handling of primates, small mammals, cats, hoofstock, fish and reptiles. Send resume to Jan Schweitzer-Koehl, Glen Oak Zoo Manager, 2218 N. Prospect Road, Peoria, IL 61603.

AVICULTURIST...care and breeding of captive cranes, including artificial insemination and chick rearing. Strong background in aviculture preferred. Full-time position starting 1 Dec. or as soon thereafter as possible. Salary \$10,000, commensurate with experience. Send resume and letter of application to Joan Fordham, Administrator, International Crane Foundation, City View Road, Baraboo, WI 53913.

ZOOLOGIST...position is with the Wildlife Survival Center, St. Catherine's Island, Georgia. Candidate will work with curators in caring for and managing animal collection. Duties include record keeping and reporting and supervision of student interns. Exotic animal care experience and knowledge of and interest in animal behavior required. Contact New York Zoological Society, 185th St. & Southern Blvd., Bronx, NY 10460.

~~The followings "Positions Available" were sent directly to the editorial offices of Animal Keepers' Forum for inclusion in this section.~~

SENIOR NATURALIST, ANIMALS...at the Western North Carolina Nature Center, Asheville, NC. Working professional management position as head animal staff for multi-faceted nature center with small, varied collection of primarily native animals. Duties include animal staff supervision, exhibit development, educational/informational duties, responsibility for dietary, habitat and health needs of animal collection. Salary \$12,000-\$15,000. Submit resume to: Western North Carolina Nature Center, Gashes Creek Rd., Asheville, NC 28805. (704) 298-5600.

PACHYDERM KEEPER...to train, handle and maintain both African and Asian elephants. Responsibilities include daily maintenance, building upkeep, cooperation in health and behavioral research and participation in public education programs. Must be able to perform and narrate public demonstrations. Area of responsibility also includes rhinoceros, tapirs, hippos and other animals. Excellent salary and fringe benefits. Contact Personnel Dept., Brookfield Zoo, Brookfield, IL 60513. (312) 485-0263.

ANIMAL HOSPITAL/RELIEF KEEPER...work as vacation relief for night keepers, commissary keepers and animal hospital keepers. Work in Animal Hospital when not otherwise assigned. Night keeper duties involve periodic check of all animal buildings and exhibit areas, behavioral and medical observation and maintenance of hydroponics unit. Commissary keeper duties include preparation of food products for delivery, intra-park food deliveries and preprocessing food. Hospital keeper duties include cleaning and feeding of animals, animal restraint and treatment, administering medication and assisting veterinarian in all aspects of animal health program. Excellent salary and fringe benefits. Contact Personnel Dept., Brookfield Zoo, Brookfield, IL 60513. (312) 485-0263.

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AAZK MEMBERSHIP APPLICATION

Name \_\_\_\_\_ Check here if renewal [ ]

Address \_\_\_\_\_

\_\_\_\_\_ \$20.00 Professional  
Full-time Keepers and  
International Members

\_\_\_\_\_ \$10.00 Associate  
Individuals not connected  
with an animal care facility

\_\_\_\_\_ \$15.00 Affiliate  
Other staff and volunteers

\_\_\_\_\_ \$50.00 Contributing  
Organizations and individuals

U.S. CURRENCY ONLY PLEASE

Directory Information

Zoo \_\_\_\_\_ Work Area \_\_\_\_\_ Special Interests \_\_\_\_\_

Mail this application and check or money order, payable to American Association of Zoo Keepers, to: AAZK National Headquarters, Topeka Zoo, 635 Gage Blvd., Topeka, KS 66606.

Membership includes a subscription to the *Animal Keepers' Forum*. The membership card is good for free admission to many zoos and aquariums in the U.S. and Canada

INFORMATION FOR CONTRIBUTORS



*Animal Keepers' Forum* publishes original papers and news items of interest to the Animal Keeping profession. Non-members are welcome to submit articles.

Articles should be typed or hand-printed. All illustrations, graphs and tables should be clearly marked, in final form, and should fit in a page size of no more than 6" x 10" (15 cm x 25½ cm.). Literature used should be cited in the text and in final bibliography. Avoid footnotes. Include scientific names.

Articles sent to *Animal Keepers' Forum* will be reviewed for publication. No commitment is made to the author, but an effort will be made to publish articles as soon as possible. Those longer than three pages may be separated into monthly installments at the discretion of the editorial staff. The editors reserve the right to edit material without consultation unless approval is requested in writing by the author. Materials submitted will not be returned unless accompanied by a stamped, self-addressed envelope.

Telephoned contributions on late-breaking news or last minute insertions are accepted. However, phone-in contributions of long articles will not be accepted. The phone number is (913) 272-5821.

DEADLINE FOR EACH EDITION IS THE 15TH OF THE PRECEDING MONTH

*Articles printed do not necessarily reflect the opinions of the Animal Keepers' Forum editorial staff or of the American Association of Zoo Keepers.*

Items in the publication may be reprinted. Credit to this publication is requested. Order reprints from the Editor.

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of Zoo Keepers  
Topeka Zoological Park  
635 Gage Blvd.  
Topeka, KS 66606**

**Jerome Lass**  
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SPECIAL EDITION

# Animal Keepers' Forum



SPRING    SUMMER    AUTUMN    WINTER  
ANCIENT ASTRONOMERS SYMBOLS



**A.A.Z.K.  
NATIONAL CONFERENCE  
1982**

*Dedicated to Professional Animal Care*

DECEMBER 1982

Executive Editor: Mike Coker  
Managing Editor: Susan Chan  
Associate Editor: Connie Cloak  
Editorial Assistant: Diana Brey

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AMERICAN ASSOCIATION OF ZOO KEEPERS  
NATIONAL HEADQUARTERS, 635 GAGE BLVD., TOPEKA, KS 66606  
Dolly Clark, Administrative Secretary

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Steve Taylor, Louisville Zoo  
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Ellen Leach, Woodland Park Zoo, WA  
Program Library  
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WA, OR, ID, MT, WY, AK  
CA, NV, AZ, UT, HI  
CANADA

## FROM THE TORONTO CONFERENCE COMMITTEE...

You plan and dream for two years. You have committee meetings and talk about "wouldn't this be great for the conference" and "what about having a...". All of a sudden, time is in short supply, tensions mount and everyone is working frantically. Then, before you know it, the conference is NOW!!! The "Now" when you find out the mistakes you have made and the things you have forgotten. But it is too late to worry because the conference roller-coaster is underway and nothing can stop it!

Then, just as fast, it is over. Wait a minute--how can it be over? Some one should write a paper on post-conference blues! Everyone catches up on much-needed sleep and gets back to their regular work routines.

The conference committee would like to sincerely thank everyone who contributed to the success of the 1982 AAZK conference in Toronto, Canada in October. Our committee worked hard for many months to change the idea of hosting a national conference into a reality. We received a lot of help from MTZ staff and volunteers, both in the planning stages and during the conference. Generous assistance from our Board of Management, the Zoological Society, and our zoo's administration, as well as the Provincial Government, the Municipality of Metropolitan Toronto, and our other sponsors, enabled us to put together what we felt was an exciting conference.

Thank you to all the delegates who shared in the conference--thank you for your offers to help with our zoo routines; for your generous donations for the conference auction, and for generally helping to make things run smoothly. Most of all, thanks for coming to Toronto--it was your presence and participation that made it a memorable event.

We had 116 delegates attend from four countries: 25 U.S. states were represented with 36 zoos (79 people), the Humane Society of the U.S., 4 companies and 2 individuals; 5 Canadian provinces were represented with 8 zoos (27 people); and we had 4 delegates from overseas (two each from Holland and England)--a truly international conference.

We would also like to extend our thanks to all the zoos and institutions who provided time, financial assistance and generally eased the way for one or more staff members to attend the conference. We are sure that this support will be repaid a thousand times through the knowledge shared and gained; contacts and friendships made; and increased enthusiasm for the keeper's work as a vital part of the zoo community.

Thank you all,

*Metro Toronto Zoo Conference Committee  
Fran Turner, Oliver Claffey, Karen Mottram, Christine Genovese,  
Pat Vandebussche and Chris Parker*



## MEET ME IN TORONTO PRONTO!

*Dora M. Jacobs, Senior Keeper  
Herpetarium, Rio Grande Zoo, Albuquerque, NM*

"Toronto" means "meeting place" in the Huron language, we were told, and what a meeting AAZK had there in October 1982! Reference to the "National Conference" is now obsolete. "World Conference" is much more appropriate, as Toronto, Ontario, Canada hosted representatives from England, Holland, and all over Canada in addition to most of the United States, and the annual award for cover art went to a Japanese zooperson.

The additional language barriers raised by these international exchanges were no harder to overcome than the usual ones presented by a Texas keeper trying to discuss animals with one from New Jersey. We all spoke English after a fashion, and zoology in particular.

The following conversation was overheard during dinner:

"We-awl feed these-heyar flamingos everwhat we have on hand, but lately they're lookin raht porely, pale and ratty, lakh rugs thrown over a fence. What-awl daht do you-awl give youarn?" inquired the Texan.

"The usual, plus ersters, with a little cod liver erl added now and then. Oil found a poil in one of 'em once," replied the Jerseyite.

"Wayull, shucks! Ah swan, we usta could get ohstas fer peanuts, but anymore they cost an arm and a laig." The Texan than cast a glance around the table. "Everwho has the napkyins would yawl pass them, please?"

"Pass the serviettes, eh?" said one Canadian to another.

At the end of the table, an Englishman hastily got up and left the room.

"Is there any more tonic?" asked a New Englander. Everyone else looked blank while she stared longingly into an empty ginger ale glass.

As someone returning from the Washroom chanced to glance out a window, she saw the Englishman dash into Loblaw's Supermarket. A few minutes later, he presented a box of Pampers, labeled on one side in French, to the Texan.

"Here are the napkins you wanted. I sigh, did you bring your bye-by or are you playing nanny with an ipe?"

"What?"

"Come again?"

"Eh?"

"Uh, could yawl run that bah one more tahn?"

I have to confess though that I was not confused by the sale of Chesterfields in a nearby furniture store only because I was a kid from Newfoundland, and that's what we called sofas too. No, Newfoundland was not part of Canada then. Now I've gone and identified myself as a relic of the Dark Ages. Well, I was right at home at the banquet and auction in the hand-carved library of Casa Loma, where the bidding was hot and heavy on a hyrax hook, a French Canadian trapper's hat, a baseball autographed by the Toronto Blue Jays, a mirror in which Bela Demeter was reputed to be invisible, and beaucoup tee-shirts. All in colour-coded Canadian money, of course, so as not to dampen our enthusiasm with the

## MEET ME IN TORONTO, PRONTO!, *Continued*

the knowledge of how much we were actually bidding.

A number of people expressed their disappointment that there could be no volleyball game this year, but I overheard rumors, excuse, rumours about organizing a water polo game in the pool. Little enthusiasm was expressed however, for my suggestion of an oryx-feces marble shoot.

The breakneck pace of the 1982 Conference was obviously well orchestrated by the Metro Toronto Double-A-Zed-K Conference Committee. If Toronto ever hosts another meeting, meet me ther, eh?



## *Coming Events*

### THE DR. BARBARA SAWYER MEMORIAL WILDLIFE CONFERENCE

February 4-6, 1983

San Francisco, CA

Sponsored by the California Academy of Sciences, The San Francisco Zoological Society and The Wildlife Rehabilitation Council, the 7th annual conference will consist of scientific presentations and workshops on raptors. Topics to be covered include: captive breeding, rehabilitation, handling techniques, housing nutrition, veterinary techniques, infant care, etc. For further information, contact: Nancy Venizelos, San Francisco Zoological Gardens, Sloat Blvd. at the Pacific Ocean, San Francisco, CA 94132. (415) 661-2023.

### SYMPOSIUM ON BREEDING BIRDS IN CAPTIVITY

February 24-27, 1983

Universal City, CA

Sponsored by the International Foundation for the Conservation of Birds in honor of Dr. Jean Delacour at the Sheraton-Universal Hotel. For information and registration forms, contact Gary Schulman, Delacour/IFCB Symposium, 11300 Weddington St., North Hollywood, CA 91601. (213)980-9118.

### WILDLIFE REHABILITATION SYMPOSIUM

March 23-27, 1983

Naperville, IL

Keynote speakers: Murray Fowler, D.V.M., The Univ. of California (Davis) and Katherine McKeever, The Owl Rehabilitation Research Foundation. Program includes sessions on general philosophy, veterinary medicine, wildlife biology, captive management and conservation education. Registration \$40, optional banquet fee is \$10. Send registration to "Symposium '83" Treehouse Wildlife Center, RR# 1, Box 125E, Brighton, IL 62012. Please indicate institutional affiliation, if any. Make checks payable to Treehouse Wildlife Center.

### AAZPA NORTHEASTERN REGIONAL CONFERENCE

April 24-26, 1983

Pittsburgh, PA

The conference will hosted by the Pittsburgh Zoo, Box 5250, Pittsburgh, PA 15206. All Keepers are welcome and encouraged to attend.

# Births & Hatchings

## BROOKFIELD ZOO.....*John S. Stoddard*

October 1982 births and hatchings at the Brookfield Zoo include: 0.0.7 Cuban anole, 0.0.2 Hingeback tortoise, 0.0.1 Siedenbrocks pond turtle, 0.0.1 Black-billed weaver, 0.0.1 Turquoise tanager, 0.0.1 Paradise tanager, 0.0.9 African grass mouse, 0.0.2 California mouse, 0.0.20 White-toothed shrew, 0.0.7 Mongolian jird, 5.3 Spiny mouse, 0.0.2 Acouchi, 0.0.4 European harvet mouse, 0.0.1 Goeldi's marmoset, 0.0.1 Squirrel monkey, 0.0.1 Spot-nosed guenon, 0.1 domestic dog and 2.1 Collared peccary.

## DALLAS ZOO.....*Beth Lasher*

Arde11 Mitchell, Supervisor of Reptiles, recently made a very successful trip to the Phillipines. In his travels he acquired 1.2 Gray's Monitor, 5 Phillipine water dragons, 3 Phillipine habu, and 4 Wagler's pit viper. These reptiles add very nicely to an already overwhelming Dallas Zoo collection.

Also our births and hatchings for the month of October 1982 include: 0.1 Klipspringer, 2.0 Nile Lechwe, 0.1 Addax, 1.0 greater Kudu, 1.0 Black-buck antelope, 1.0 Besia Oryx, 0.1 Yellow-backed duiker, 2.0 Kirk's Dik Dik, 0.1 Llama, 0.1 Hamadryas baboon (DNS), 0.0.2 Red kangaroo, 3 Gouldian finch, 2 White-cheeked touraco, 1 Double-striped thick-knee, 1 Society finch, 5 Pueblan kingsnakes and 5 Coahuilan box turtles.

## ROGER WILLIAMS PARK ZOO.....*Liz MacLaughlin*

Births and hatchings from 1-1-82 through 11-8-82 include: 3 Golden eagle, 5 Barbados sheep, 1 Ankole cattle, 2 White-tailed deer, 2 Llama, 2 Eland, 2 Roosevelt Elk, 1 White-handed gibbon, 2 Reeve's muntjac (DNS), 2 Bison, 8 Black-tailed prairie dog, 9 Spiny lizards and 16 Canada geese.

## BRONX ZOO.....*Margaret Price*

August and September 1982 B & H include: 58 King cobras, 14 Red spitting cobra, 6 California kingsnake, 16 Light phase Indian pythons, 3 Madagascar ground boas received from Ft. Worth Zoo, 4 Taylor's cantils received from Gladys Porter Zoo; Birds: 1 Malay peacock pheasant, 8 Ringed teal, 1 Indian pygmy goose, 2 Green-winged teal, 2 Rosey-billed ducks, 2 Bornean argus pheasants, 1 Tufted puffin, 2 Bahama pintails, 1 African pygmy goose, 2 Robin Chats, 1 Long-tailed grass finch, 1 Brushland tinamou, 1 Rothchild's mynah, 2 Green Wood Hoopoes, 2 Purple Glossy Starlings, 2 Bustards and 1 Southern blue tanager.

October 1982 additions include: Birds, 3 Red bird of paradise, 4 Lilac breasted roller and 1 White-quilled black bustard; Reptiles: 16 Brazilian boa, 5 Sinaloan milksnake; Mammals: 12 African spotted gray mouse, 1 Guanaco, 5 Brow anteloped deer, 2 Guar, 2 Axis deer, 2 Bushy-tailed jird, 1 Lesser spear-nosed bat, 1 Mongolian wild horse, 1 Red brocket deer, 1 Sugar glider, 1 Sambar, 2 Wild cavy and 1 Degu.



# Conference.....82

## An Overview of the 1982 AAZK Board Meeting at the Toronto Conference

By  
*Patricia E. Sammarco*  
AAZK President/Zoo Keeper

Three of the five national AAZK board members were present at the meeting table; Mike Coker having resigned from the board, and Mike Maybry unable to attend. As is traditional, meetings are open to all members, and many attended the entire day's discussions while others sat in on topics of individual interest. This is the first time that board business was completed in one day.

With the nominations of Connie Cloak and Steve Taylor, Steve was elected by the board to serve the remaining year of Mike Coker's term. Both are eligible for nomination for this year's board election. Steve, Mike Maybry and Jill Grade will serve the association as board members through December 1983, and these three board positions will be filled during this year's election process.

With the increasing number of AAZK activities, the board has divided up the duties of overseeing the programs and projects among the board members. The president, Pat Sammarco, will continue to oversee National Headquarters, Chapter Affairs, International Affairs, the Regional Coordinator System, and contact with other associations. Vice President, Jill Grade, will advise the educational activities. Mike Maybry will advise those handling membership services; Kevin Conway will advise information services, research and awards committees; and Steve Taylor will advise those working with publications. All activity heads have in the past dealt directly with the president; the new assignments will provide chairpersons with board advice and board members with more contact with the various activities.

Thanks to a lot of effort from Mike Coker, and membership vote, AAZK incorporation will be finished by January.

Three amendments to the BY-LAWS were discussed by the board and met with membership approval. In Article 7, Section 4 of the incorporation papers, annual reports to the membership were not required. This has been a tradition, and the wording has been changed to make such reports mandatory.

The PROFESSIONAL membership category has been expanded to include keepers retiring with at least 10 years service, and who were professional members during their last year before retirement.

The size of the Nominations and Elections Committee has been reduced to three members.

During 1982, as of 9 September, the association has grown from 1342 to 1507.

A suggestion was made to make a decal and DIRECTORY part of the membership packet to CONTRIBUTING members, and this will be done. Another suggestion that would allow for joint memberships within a household (i.e.. husband and wife at a reduced rate) was discussed and rejected. Each member is entitled to full participation and services.

An Overview of the 1982 AAZK Board Meeting at the Toronto Conference  
(Continued)

A pay raise of \$.75 per hour was granted to our two association employees. Dolly Clark, Administrative Secretary, and Susan Chan, AKF Managing Editor. The time and talent of these two women is worth a great deal to the association.

AAZK set up a budget for the first time last year and we are now in the best financial shape ever. All publications were paid through the AKF budget, and as of September, 63% of our projected revenue has been raised with the heaviest membership renewal time ahead.

Since Patti Kuntzmann has taken over the Chapter Affairs Coordinator post, she has been doing very well. During the last year, eight new chapters have been chartered, bringing the total of active chapters to 27. There are eight chapters that are inactive and one that has lost its charter, but with Patti's encouragement, renewed activity is the trend, and some very old chapters have reactivated. Since there seems to be confusion in that members join a chapter without being national AAZK members, an unconstitutional situation, Patti will try to work out a system in which chapters will renew all their memberships as a group.

Randy Adolph will be corresponding with international members and foreign keeper associations, and will keep us all aware of international zoo keeping activity. The board approved the funding of his membership in foreign associations so that he will be better able to get information. Randy will be in close contact with Elandra Aum, Keeper Exchange Coordinator, as plans are made to participate in a China exchange that is in the organizational stage.

Regional Coordinators will be asked to volunteer as members of the Nominations and Election Committee. Because of their more intimate contact with fellow keepers, it was suggested that RC's be preferred for this committee; however, other members will also be considered. There will be three board positions to be filled as of January 1984, and the nominations procedures will initiate in March. Committee members are to be reminded that service on the committee eliminates eligibility as a nominee.

It was suggested that the Regional Coordinator system be abolished in favor of a more free-style type of activity that would encourage participation by all members in spreading the word about AAZK activities. While members will be asked to be active in promoting AAZK, volunteers to serve as Rcs will also be encouraged, and the system will be analyzed by Head RC, Mike Carpenter.

The ANIMAL KEEPERS' FORUM continues to improve in quality. Advertisements have been added this year, and a classified ad section may be added to help offset expenses. The editors are seeking small artwork pieces for inclusion to enhance articles and fill small spaces. Suggestions were made to have AKF listed in the Library of Congress as an information source for those not familiar with zookeeping, and to make the index more effective by classifying information by topics and zoos.

The Gestation Notebook is being reformed and will be available soon.

The Infant Development Notebook will be printed soon.

The South Florida Chapter is organizing the Zoo Diet Notebook and is seeking ideas on initiating this collection of diets.

All notebooks will be published in a loose-leaf format so that informa-

An Overview of the 1982 AAZK Board Meeting at the Toronto Conference  
(Continued)

tion can be easily added. Each notebook will have a separate cover, but will be compatible with each other, and with the AAZPA Infant Diet/Care Notebook, so that each member may collect information that is specifically interesting.

The AAZK MEMBERSHIP DIRECTORY is being prepared for its fifth edition, and continues as a useful tool for keeper communication. Award winners will be designated at their entry by some symbol, and the Keeper Accomodations participants will be noted by KAL rather than the symbol as it appears this year. Institutional phone numbers have been added this year, and others will be listed at member's request.

Ellen Leach is looking for an assistant on the BOOK REVIEW project, to help her seek out new books of interest, contact publishers, and coordinate reviewers.

The CAREER BROCHURES will be published in color this year. The efforts of the Brookfield Chapter are greatly appreciated in initiating this pamphlet.

The History Committee will have a full report ready for the Philadelphia Conference.

The Keeper Data Coordinators have been creating two questionnaires to gather information on zoo keepers. The first will be printed in the AKF requesting information from keepers. The second will poll zoo administrators. A burnout hotline was also suggested as a means to identify reasons for good keepers dropping out. Discussions included the collection of current statistics on keeper salaries, education, etc.

The Professional Standards Committee is looking for more members, and has established a four-part plan of activity: 1) collect job descriptions, 2) evaluate hiring standards, 3) establish a foundation of standards, and 4) educate the public to our concern for professionalism.

The Legislative Action Committee continues to use informational resources to keep all members informed, and to encourage appropriate response on proposed legislation. The Federal Register has become too expensive, with limited value, and will be dropped as a subscription. The Checklist of Congressional Committees was approved as an additional resource.

The Research Grants project on Topeka Zoo's Echidnas will be completed this winter. The tailed-frog project has been delayed until spring due to availability of animals, and the Capybara project remains as a non-funded example of research grant application. The 1983 agenda includes Susan Barnard's Reptilian Parasite project, and the committee will be accepting grant proposals. Frank Kohn has been appointed as the head of the committee as of January 1983, replacing Mike Coker. Frank will be considering opening the grant application opportunities on a quarterly basis rather than annually. Grants will remain annual, and within the specified guidelines already established with the exception that AAZK need not be the first publisher of the results. A formal report to the committee/AAZK board will be required, a short report will be published in AKF, original papers will be available on request, and results may be published in research journals.

While the relationship between AAZK and ZOO BIOLOGY is still being defined, Frank Kohn remains our liason and will get a subscription so that he may

An Overview of the 1982 AAZK Board Meeting at the Toronto Conference  
(Continued)

keep all members aware of the journal's value and encourage participation.

The Awards Committee developed the new AAZK Meritorious Achievement Award which received board approval and was initiated this year. Awards will be drawn for past conference hosts and past national headquarters sites. In reviewing the award guidelines for various awards, the board decided to eliminate language that would qualify nominators since there is no reason to eliminate anyone who appreciates keeper contributions and professionalism. The committee will be asked to push up their timetable enough to insure that award recipients will get sufficient notice to be able to attend the conference award ceremonies.

The board approved the Keeper Education Committee members suggested by Judie Steenberg. These are Liz McLaughlin, Jim Ellis, Kevin Conway, Mike Coker, Chris Parker, and Wayne Buchanan. The committee will move to tie in other AAZK projects that are related to keeper education and to help to develop educational materials to compliment the AAZPA Training Manual. Further direction will come from member input at the conference workshops.

The LOOK TO THE FUTURE film project is progressing well. Completion of the script, naming locations and people to be filmed, and the development of the fund-raising team will be this year's project.

Library resources as an AAZK project is still being developed pending progress from the zoo librarians.

The Keeper Exchange project has been expanded to include technology exchange in the form of a journal, and the development of a separately incorporated business, endorsed and encouraged by AAZK. The North American Staff Exchange Program (NASTEP) is being created by Robert Keel and keeper Elandra Aum and will add the technology of computers to the project. Since NASTEP is proposing a large budget and paid staff, it is in the best interest of AAZK and NASTEP to have them separately incorporated. Elandra will be acting as AAZK coordinator for a proposed China exchange offered by the China-U.S. Scientific Exchanges, Inc. and in the form of a symposium requested by the Zoological Society of China.

Activity within the program library will increase this year with Mike Crocker more actively persuing new programs. The use of video taped presentations was discussed. Chapters, as well as individuals, are encouraged to develop programs as slides, films or video tapes. The committee chairman will be responsible for previewing the programs and approving reimbursement.

Discussions on the topic of conferences included the need for conference hosts to communicate with each other. Notebooks are kept in triplicate by each host so that each future host gets information on planning by the two past hosts and one book is kept at National Headquarters. Bids from South Florida Chapter and Puget Sound Chapter were accepted. Vote from the membership during the general membership meeting named Seattle as the site of the 1984 conference. The concept of having a combined AAZK/AAZPA Conference, as presented by the Florida group is intriguing. It was suggested that the idea of workshops based on AAZK projects be considered for conferences. The board decided to encourage the Administrative Secretary to attend at least every other national conference, with the association paying for her registration fee, travel and lodging as necessary.

An Overview of the 1982 AAZK Board Meetings from the Toronto Conference  
(Continued)

The Keeper Accomodations List includes 37 accomodators in 25 states and provinces. There is no way to determine use since the accomodators are being listed in the DIRECTORY and keepers are making their own arrangements; but a survey will be made to poll hosts. The Toronto Chapter will continue to coordinate the list and encourages all keepers to add their names as hosts and use the offer of hospitality as they travel.

The Animal Data Transfer Form continues to evolve as a source of keeper insight into the individual needs of the animals as they are moved from one zoo to another. Since the volume of production increases, the board approved the \$8 expense in creating a sturdier printing plate. It was suggested that project head, Bernie Feldman, again survey to assess the use and non-use of the form. It was also suggested that the three routing instructions on the top of the form be changed to : 1) Keeper receiving the animal, 2) Zoo file/Veterinarian, 3) Keeper sending animal. The form remains a free service from AAZK and keepers are encouraged to write to Bernie for forms rather than duplicating them and loosing the advantage of the self-duplicating feature. Shipments are usually 50 copies with some orders for as many as 1000 having been filled.

Logo decals are a project of the Memphis Chapter. National Headquarters will purchase decals from the chapter for inclusion in the CONTRIBUTING MEMBER'S packets.

The T-Shirt project is again in the hands of a chapter with the Phoenix Chapter appropriately arising from its ashes and taking on the job.

KEEPERS CARE buttons are still available from the Lincoln Park Chapter.

The board will again remind AAZPA of the appropriateness of having a Keeper category in their association. A letter will be sent to AAZPA prior to its board meetings.

In all, the board meetings went well, with many member's suggestions being considered and benefiting AAZK. AAZK is and should always remain an association of keepers with board members coordinating member input. AAZK has grown, developed and is now maturing--producing sound projects as a professional association thanks to the enthusiasm of all of its members.





## RENOVATION OF A 50-YEAR-OLD BIG CAT EXHIBIT

By  
Mary L. Swanson, Keeper II  
Fresno Zoo, Fresno, CA

Delegates to the AAZK conference in 1981 were witness to the beginnings of one of the most significant renovation projects ever undertaken at the Fresno Zoo -- the remodeling of our ancient large cat exhibit. The building, variously referred to as the cat barn or the cat house, was the oldest in the zoo, having been built in 1932.

The building was little more than a night house for the animals with cement floored, chainlink fenced, dog-type runs. It had four runs on each side, each 10 feet wide. The tigers had a 6 foot section at the end of one run blocked off for a one foot deep pool. The center of the building was a public walk-through area with double doors at each end. The public was separated from our work area by a chainlink fence and a 2½ foot high wall.

The old cat barn became our most criticized exhibit. People didn't like seeing big cats in narrow cement runs -- especially the year when four half-grown tigers had to reside with their mother in one run. Aesthetically the cages were a horror. We spent a lot of time defending this exhibit. But we too hated the exhibit. We knew the big cats would look better and feel better on dirt, and we wanted more space for the cats. The makeshift pool was inadequate for tigers to cool off in our sometimes 110°F temperatures. The ancient building was so drafty the furnace couldn't heat it adequately in winter, unless the thermostat was turned up to 90°F -- which cost us a fortune in utility bills. The roof leaked horribly.

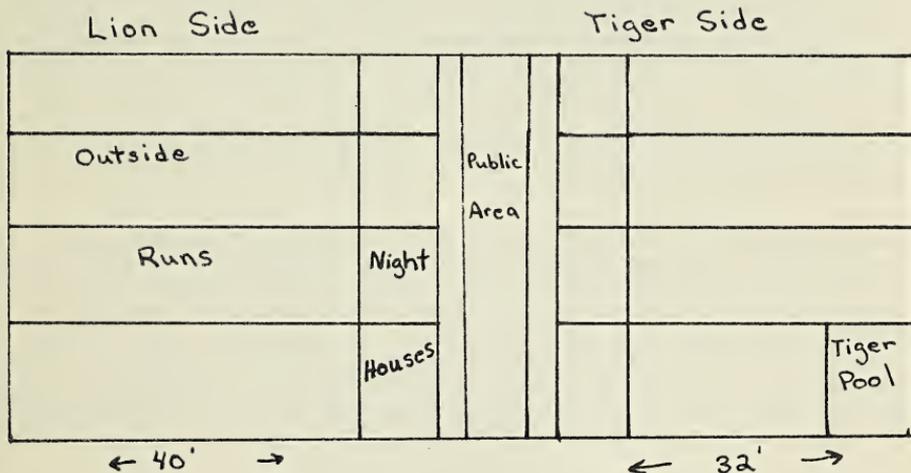
In spite of the inadequate exhibit, we had had some breeding success. The tigers had consistently bred well, summer and winter. But as the building deteriorated more and more, we began to lose winter babies. So we prevented breedings that would have resulted in winter births. This meant separating the tigers, causing a strain on the space availability.

The basic problem was that of most zoos -- lack of money to build the moated exhibits we really needed. So, in 1978, we took desperate measures to improve the cats' situation. We tried to renovate the lions' cages on our own -- with keeper labor. We cut down run walls, doubling the cage size. In over 100 °F weather, we hauled in rocks and dirt and cut sod out of the park around us. It took three months of effort in our so-called spare time. The lions loved it -- they demolished the grass and plants. But it was a failure. The dirt didn't drain and winter rains turned it into a swamp and a nightmare of maintenance.

What we did learn was that renovation of this exhibit was a job requiring expertise and effort far beyond our in-house capabilities. So we went to the city council and to the public, and threatened --and meant every word -- that if we could not get some money to improve the cats' exhibit, then we would get rid of all the cats. We got the money we needed for a modest renovation.

RENOVATION OF A 50-YEAR-OLD BIG CAT EXHIBIT, Continued

In September 1981 construction began. The cats had to be locked up inside for the duration, and destruction of their awful runs began. It was traumatic for the cats, with blow torches and bulldozers creating a din around them. But we had no place else to put them, and they adjusted fairly well.



OLD CAT EXHIBIT

It was also traumatic for the construction crew -- they had to put up with cat wastes flooding out into the construction area every morning when I hosed out the inside. After the big window covers on the lion side were removed for alteration, they had to watch out for our young lion, Moja. He liked to swipe his paws at them as he supervised the project from his window.

It was a difficult period for me, too. Trying to feed and clean while climbing through the debris of construction was amongst the trickiest zookeeping I've ever undertaken. Each day brought some new hazard -- like the weekend there were no lights because the electricians took out the breaker box on a Friday -- 150 feet of extension cords, a floodlight in one hand and a hose in the other, was a very maddening way to clean. One day a tiger went up the wall and came down with her full weight on an outside door cable. The door slammed up, but the other tiger didn't bolt out and the door came right back down. But the incident finally forced the construction crew to install the door stops meant to prevent that.

Outside, massive changes were taking place. The cement floors of the destroyed runs were punched every 6ft. for drainage and dirt was hauled in. A planter was built 3 feet wide and 3 feet from the building. This time the plants would be outside the cage where the cats couldn't destroy them. This left a strip outside where I could complete washdown after hosing out the inside cages. Instead of runs, the outside area became one large square on each side -- 32' x 42.5' on the south side for lions and 24' x 42.5' on the north side for tigers.

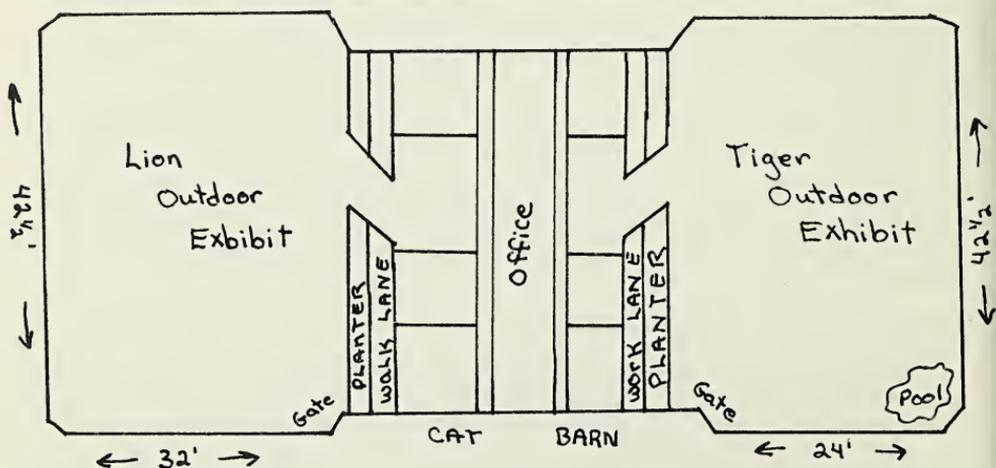
## RENOVATION OF A 50-YEAR-OLD BIG CAT EXHIBIT, *Continued*

The outside areas are enclosed by telephone poles supporting the 15-foot tall wire. Large boulders were brought in and placed strategically for good resting spots. The dirt was mounded in rolling hills for a nicer appearance and for drainage.

The wire, made by Behlen Co., was  $\frac{1}{2}$ " thick with 2' x 4' mesh, with a black plastic embedded in the metal rather than coating it. Each strip is 15' x 4'. It is bolted together at each joint. Horizontal poles at top and bottom are bolted to the vertical poles to form the framework. The corners of the area are not square. It was easier and more aesthetically pleasing to set the poles so that a single section of wire covers each corner, blunting the square. This made it easy to change the original cage door plan to just putting in a simple hinged door in a back corner. I did have a little trouble convincing the architect I actually needed to enter the outside cage.

Cables criss-cross overhead to keep the pole framework straight and to support the light wire installed overhead to reassure the public and to keep out the peacocks. Outside lighting was added for night events. The tigers' pool was deepened to 30 inches with a larger area and a more interesting shape, with overhanging rock. At my request, the lions got a shallow, more natural looking drinker than their old square box. The lions' window covers were altered to make it physically easier to provide ventilation. Each side is connected to the building by a single tunnel 8' x  $4\frac{1}{2}$ ' x  $4\frac{1}{2}$ ' high. The center of the building is now a keeper office.

During construction we sometimes had trouble convincing the public that we really couldn't let the cats out so they could see them. But during Christmas week, we gave the cats a present -- 5 days outside. The wire part was complete so we could safely let the cats out. We were especially anxious to get the male tiger out because he had been losing weight and pulling out his hair. The tigers had never been on dirt before and walked gingerly at first. Rajah even ate some dirt. We were gambling that Peggy wouldn't come in heat. (They had been separated for 20 months.) We lost that gamble -- she came in heat within half an hour. It was great therapy for Rajah -- I'd never seen such a silly grin on his face. Peggy enjoyed it, too, and the result four months later was her eighth



"NEW" CAT EXHIBIT

## RENOVATION OF A 50-YEAR-OLD BIG CAT EXHIBIT, Continued

litter. The adult lions enjoyed the new cage, too. Our young male, Moja, was so excited that he tripped over the rocks.

After Christmas, things moved fast. The sprinkling system went in. Sod of touch Bermuda hybrid grass was installed. And the outer edge of soil cement was put in. This was to prevent erosion and to prevent the cats from digging under the pole framework while still allowing a gap for drainage. It's a simple procedure. The dirt is raked lightly, dry cement is spread on top, and the dirt and cement are raked together. Then the area is wet down enough for the cement to set. The mixture is about one inch thick and looks like dirt when finished.

The building was re-textured and painted and the roof repaired. Poles were installed in pleasing curves around the keeper work areas and the entrance gate is a section of poles.

Landscaping went in around the outside in a curved pattern to soften the outlines. Bamboo went behind the pole fence and between the buildings and the cages--eventually these plants will be tall enough to hide the building from public view.

The pole rail fence replaced the original chainlink fence separating the public from the cage. Later we added a third rail and more bushes to prevent children from climbing through. The exhibit was finally completed in January 1982, some four months after we began.

Naturally some problems cropped up. Persistent leaks in the roof took months to repair. The sod had no time to take root before releasing the cats on it and they kept tearing it up for months. Now it's doing fine and resists their scratching. The tigers drip so much water from their pool, that lower levels of the grass get too much water. So instead of using the sprinklers, I have to water the hills by hand. I had to add wire to the exposed wood on the tunnel poles after the lions turned them into scratching posts. The natural drinker on the lion side is five inches deep, and no one but me thought it needed a drain, so I have to sweep it out.

Maintenance of the outside is really easy otherwise. Because I had keeper input into this renovation, I was able to change their ideas on drainage of the tiger pool and it is easy to hose out. The drain valve is on the outside of the cage so the pool can be drained even with the tigers in the exhibit. But it is not getting very dirty in spite of the fact that the tigers defecate in the pool. The continuous overflow system keeps it pretty clean.

The new heating system has separate thermostats on each side. This allowed me to raise the temperature on just the tiger side when the cubs were born in April. That is a much better way of coping with temperatures that can get down to 18°F in winter.

When they were old enough to go outside, the tiger cubs enjoyed the new exhibit too. It was great to watch them romp on the grass. The pool was kept lowered to 6 inches when they were out. If they had not left us for Kansas when they were three months old, we would have gradually have raised the level until we were sure they were swimming.

We don't want to breed lions and we didn't want the tiger, Rajah, to breed with his two-year-old daughter. So young Rani, the tiger, and Alice, the lion, now have birth control in the form of hormone implants (melengesterol).

## RENOVATION OF A 50-YEAR-OLD BIG CAT EXHIBIT, *Continued*

Overall, the exhibit renovation has turned out well. The cats love it. The public is delighted with the change. We are glad we could keep our big cats and improve their lot. But it is only a temporary stop-gap until we can build them the exhibits we dreamed of in the first place.

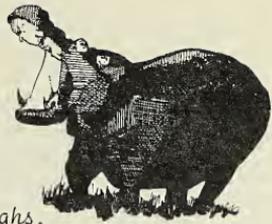
Such renovations are a part of our program to improve our zoo in spite of a lack of much money. Since the AAZK delegates viewed our small zoo in September 1981, we have made several improvements. The flamingo area has been re-sodded and landscaped. We replaced the chainlink fence by the giraffes with a fence matching the adjacent cat exhibit. We cut huge swaths in a vast expanse of blacktop and replaced it with landscaping and lighting. The hippo exhibit was renovated with poles and landscaping. All of these projects were done with public donations, some donated labor and staff labor.

One just completed project took years of fund-raising, a lot of luck and nearly ten months of construction time. We have just finished our long-awaited new elephant exhibit. Before the elephants moved in, we had a very fitting beginning for this exhibit. On 28 August, we had a wedding inside the exhibit. The construction foreman and his bride (who is a volunteer keeper) said their vows in front of the elephants' pool.

This new elephant exhibit was dedicated on 9 October 1982. We wish all of these projects could have been completed in time for the delegates to see at the 1981 conference. But we have lots more projects planned and invite you all back to see the continuing changes at the Fresno Zoo.



## TALKING ZOOKEEPER BLUES



If you ever get bored and you need to move around,  
The hustle of the city is getting you down,  
Take a trip out to the Metro Toronto Zoo.  
We've got 700 acres and miles of paths,  
If you saw behind the scenes you'd have lots of laughs,  
And there's about 3,000 animals out on view.  
(Some of the wildest animals wear uniforms...!)

There's lions and tigers, hippos and seals,  
The usual stuff that makes the kids squeal,  
Camels, elephants, giraffes and hundreds of birds.  
We've got all kinds of reptiles, fishes and plants,  
Winos, rhinos, cockroaches and ants,  
And all of those exotic animals drop exotic turds.  
(There's a few turkeys there, too  
As seems to be the case with most other zoos...!)

If you want to take a trip from west coast to east  
And see a few Canadian beasts, take a ride on our \$14,000,000 train.  
You'll see grizzlies, deer, bison, and moose,  
Arctic wolf cubs running loose,  
As the train rolls slowly through that ol' Domain.  
(Lazy river flowing, soft breezes blowing,  
It can be a nice place to work...in the summertime...)

Politicians and others if they get their way  
Will commercialize zoos to make them pay,  
They just don't see them as a Cultural Institution.  
They'll change them to a circus given half a chance,  
With bears in skirts and chimps in pants,  
Now we all know that isn't the solution!  
(My idea of a zoo is breeding pairs and groups  
Of all sorts of rare and interesting animals  
In tastefully designed exhibits and surroundings...)

When I was a little boy, I wanted to work in the zoo,  
Well I'm a big boy now and that's just what I do.  
I earn my living most every day, trying to breed rare species,  
I give them what I think they need and I clean up their feces.

The emus kick and the snakes they hiss  
When you're underneath them, the fruit bats piss.  
You get bit and scraped and pushed and shoved around,  
Boil in the summer, freeze in the snow,  
Work weekends but still we know it's the greatest job we've ever found!

There is an organization called the American Association  
Of Zookeepers dedicated to professional animal care,  
Once a year in the fall, they get together, try and play volleyball  
And have a Conference, their experiences to share.  
(They come from across the nation  
Indulge in stimulating conversation and maybe a little intoxication, etc)

So if you ever get bored, tell you what to do,  
Get yourself to the local zoo,  
You can go by car or ride by bike or bus.  
Take a few pictures, meet the keepers!  
Most of them are more than just shit sweepers,  
You'll see they're normal people just like us!!!

Oliver M. Claffey  
Metro Toronto Zoo  
© 1982



A QUESTION OF PRIORITIES  
(Are Zoos Endangered?)

By  
Neville Pike, Metro Toronto Zoo  
Toronto, Ontario, Canada

Diversification is perhaps the foremost danger to the longterm well-being of world class zoos and to professional oriented keepers.

As zoos shift their emphasis and energy from conservation, education and well-designed animal environments to outdated, hackneyed forms of animal entertainment the impact is felt immediately by keepers who discover they are expected to be animal trainers instead of keepers.

The reason most often given for diversification is that in these economically troubled times the added revenue can be used to upgrade existing exhibits and build new ones. The reality is that revenue from camel rides usually results in bigger and better camel rides. The more successful the entertainment, the more the original goals of the institution are sidestepped. The best way to be a successful zoo is to concentrate on being just a good zoo. Disneyland is perhaps the finest entertainment park in the world; it doesn't try to be a zoo; it understands its goals, sticks to them and has a maxim that only the best will do. Zoos should not feel bad about not being a Disneyland, they should feel good about being a zoo.

MTZ began to diversify just a short time ago and already we have seen pony rides, camel rides, bird of prey demonstrations, tortoise races, a fishing derby, dog sleds and a petting zoo. For the near future yak and reindeer are being trained and a massive expansion of the petting zoo is already at an advanced planning stage and will no doubt be constructed with great speed next spring. Meanwhile, many exhibits are eroding away unchecked, there are problems with inadequate water facilities and shade, holding improvements have been stalled or cancelled and keepers continue to spend hours removing eroding dirt from useless moats in work that is demoralizing and counter-productive. Many of these conditions have existed for years.

It seems that the powers-that-be have concluded that zoo exhibits alone are uninteresting and must convert the zoo into a multi-faceted entertainment park ranging from a circus to a children's playground. The view held by professional keepers is that no amount of rides and shows will help the zoo if exhibits are allowed to deteriorate unchecked. The average zoo visitor still comes to the zoo to see wild and exotic animals and we must present them in well maintained, interesting exhibits that strike the visitor and perhaps instill a long lasting interest in zoos and their inhabitants.

All of this will sound very idealistic to some I am sure, but a good zoo is built on ideals. The ideal that all animals in our charge, regardless of monetary cost, are worth caring for and preserving for their own intrinsic value is the catalyst that generates the dedication of zoo staff. It is what keeps the zoo alive, and without this commitment the zoo will not progress.

Although direct animal contact through rides or petting can be a useful educational tool, it should be kept to an absolute minimum and not interfere or restrict the development of the zoo's original goals. We

## A QUESTION OF PRIORITIES (Are Zoos Endangered?), *Continued*

must involve the public more in the daily activities of the zoo, far too many visitors believe that all a keeper does is feed the animals. A zoo is a vibrant, bustling place with vets, and dieticians and carpenters, we have to inform the visitor of the various components that gel together to ensure an enjoyable and rewarding day at the zoo. The exciting challenge facing all zoos today is to convince the general public that zoos are the "in" place to visit. We can only do this through education and properly maintained, progressive exhibits.

MTZ has the potential to be the finest zoo in the world--we won't achieve this if our energy is directed toward fishing derbys and tortoise races.

Keepers need to be concerned about diversification--we plan an entire career at the zoo whereas the interest of board members and politicians is usually fleeting.

It is really a question of priorities--if your zoo endangered?



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## COOKBOOK SALES TO BENEFIT REHABILITATION PROGRAM

*Submitted by Judie Steenberg*

INCREDIBLE EDIBLES...is a collection of recipes from the Keepers and Staff of the Audubon Park Zoological Gardens. All proceeds from the cookbook go to the Wild Bird Rehabilitation Program at the Audubon Park Zoo. A page explaining the program states, "Your support will help return a heron, hawk or owl to freedom".

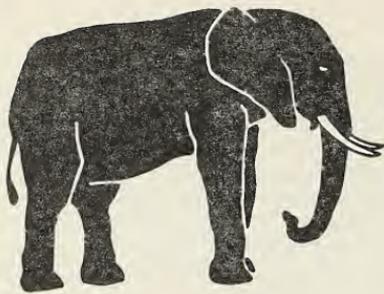
Sections include recipes on breads, dips, appetizers, soups, salads, sauces, Louisiana dishes, main dishes and desserts. Additional pages in the back give information on substitutes and weights/measures. There are 131 pages in all with several extra blank pages for adding your own recipes.

Leaping Lemon Lemur Bread, Flamingo Fun Fondue, Roast Gnu Potatoes, 50#s of Crayfish, Toad-in-the Hole, Birdhouse Chicken and Zoo Keeper Chicken, Mouse ala Orang-utan, Lihakartulipott (Finnish Potato Pot), Zabaliogne, Chocolate Capybara Cake and Hippopotamus' Misery are for real recipes in the book.

Verse and illustration are interspersed among the recipes throughout the book. The Louisiana recipe section includes Crabmeat Au Gratin, Sunny Shrimp & Baked Oysters with bread crumbs and Garlic. Tuna Cashew, Pork Chops in Beer and Beef Bourguigon to Beef Wellington are in the Main Dish Section. There are even three Quiche recipes for "Real Men".

At \$10.00 a copy, you can acquire a unique cookbook and help the Audubon Wild Bird Rehabilitation Project. Contact Frank Kohn, Audubon Park Zoological Gardens, New Orleans, LA 70118 for your copy.





## BIRTH AND REARING OF ELEPHAS MAXIMUS

By  
Jean Hromadka, Elephant Keeper  
Miami Metrozoo, Miami, FL

On 2 July, 1981, South Florida was honored with the first successful Asian elephant birth. The parents lost their first offspring in 1977 but fortunately at the age of fifteen were able to produce a healthy male calf. "Spike's" estimated weight and height at birth was 200 pounds and approximately 37 inches at the shoulder. Seetna conceived sometime in the fall of 1979 and by July 1980 lactation was in progress. The bull at this time was no longer allowed to approach the cow as she would outwardly attack him. The female remained aggressive toward the other elephants and handlers especially at the time of birth and the few months that followed. The only exception was head keeper Bill Doss, who had raised her from the age of three years.

As her personality started to change, so did her physical appearance. She gradually put on weight and her breast slowly continued to enlarge. When the great day finally arrived there was a definite behavior change. Her appetite was extremely great and she drank large amounts of water throughout the day. A white runny discharge from her vagina was also recorded at 11 a.m. Bill stayed with her that evening to record the events of the birth and to assist her in any way. Seetna was kept off chains a year before the birth and was given the largest stall to herself as well as access to the elephant yard in the evenings. Another discharge was observed at 10 p.m. followed by her becoming very restless. She began rubbing her belly against the bars and flicking her tail under her legs. She would also squat as if she were constipated and wanted to defecate. Walking seemed to ease the pain so head keeper moved along with her on the paddock for almost an hour.

By 11:30 p.m. she decided it was time and headed back to her stall. At first there was a lump at the base of the tail where the foetus first exposed itself. Within minutes the newborn splashed onto the barn floor landing with a thud. Immediately Seetna ripped off the foetal sac and administered three stiff kicks to the infant's midsection. She also pushed and rolled the baby under her head as if she were trying to stimulate him. Finally the calf gasped out a deep sigh and began to mutter low squeals and squeaks.

A lot of blood laid on the stall floor so it was very difficult for the calf to get his footing. Seetna also flung afterbirth all over her stall so dry areas were scarce. The calf sat there in a "stretched" position while his mother crouched her head down next to his body and forced gusts of air through her trunk as if communicating to her son for the first time. In appearance his skin was pink and hairy, the spine almost V-shaped, his trunk tightly curled and his ears plastered against his head. He struggled to his feet for over fifteen minutes but kept slipping on the afterbirth. Seetna aided him by nudging him out of the stall with her head. When they reached the dirt of the paddock, Spike was able to stand almost immediately.

In that first hour, Spike was walking, he also took his first bit of nourishment. Seetna accomplished this by pulling Spike close to her side, lifting her front leg, then guided the calf under a teat with her trunk. Spike nursed constantly from that point on but at ten second intervals. Most of the morning was spent in the paddock walking, stopping occasionally for a quick nap or drink. Once they returned to the barn where the calf was allowed to sleep for twenty minutes. It was also observed for the first time

## BIRTH AND REARING OF ELEPHAS MAXIMUS, Continued

Seetna covered her baby totally with fresh hay which acted as protection. She did this every time he laid down for a nap. Only five hours old, the calf was led back into the yard and took his first swim. Seetna walked into the canal with Spike following right behind her tail. They swam in up to eight foot of water over the distance of three hundred yards. When the baby grew tired of dog-paddling, Seetna would position her body under Spike's and help him crawl onto her back. Total time spent in the water was about fifteen minutes. She then led him back onto land long enough for him to nurse and take another short nap. By 8 a.m. she was ready to return to her stall where she remained for the rest of the day.

Spike's first day was spent for the most part nursing and napping. His skin was soft, pinkish in color and very hairy. His toenails and pads were pure white and spongy soft. His eyes were blue but bloodshot and half opened. In the first two weeks it appeared that his eyesight was limited for there was very little eye movement. Before those two weeks passed, he was flapping his ears and even though at first he ignored his trunk, he would occasionally gently step on it with his foot and roll it back and forth. His trunk seemed to always be in his way but by the third week, he started to splash water and fling it around like a new toy.

When he reached one month old, he was actually flushing water in and out of his trunk and throwing fruit and grain up in the air with it. Well into the second month, Spike's body evolved into a short stocky build while his spine rounded to a well proportioned curve. His eyes were completely opened and alert. As his body appearance changed, so did his personality. Instantly he became interested in his surroundings, especially the elephant keepers. Seetna tolerated short visits from the staff but eventually threatened the visitors or promptly led the calf away from the interference. The only exception was our head keeper who was responsible for raising the mother from the age of three. She allowed him to interact with the calf, enter the maternity stall and even squeeze milk from her teats.

We estimated (See Table I) that Spike was growing on the average of two inches a month and gained 75-100 pounds per month. At one year of age, he stood 59 inches tall at the shoulder and weighed between 1200-1500 pounds. During a normal eight-hour day, the calf nursed four times an hour at ten second intervals. He slept 16-18 hours a day in the first month. The length of his naps shortened as he grew from 50 minutes to 20 minutes. Seetna was very strict about his naps especially if he was making a nuisance of himself. After she would clout him sharply, he'd cry out with pain but immediately lie down and sleep. When Spike was about eight months old, daytime naps no longer took place.

Seetna was a head strong mother but not an unkind one. When Spike was four months old, Seetna was given a coconut as a special treat. Of course the calf was right there to investigate the new situation while the cow cracked it open with her foot. She then proceeded to clean the meat out of the pieces of the shell. Since Spike had the last edible part, Seetna tossed him an empty shell which he quickly snatched up and she then proceeded to diplomatically eat the last bit of meat. Then there was the evening feed out. This was the highlight of Spike's day for he would use every ounce of energy to trudge through the food squashing the fruit under foot while throwing bits of food over his head with his trunk.

I believe what he enjoyed doing the most was skating on the bananas. Seetna tolerated this the first three months, but as he got a little older she would not hesitate to slap, nudge or kick him away from the food. Spike started gumming food in the first month but did not actually start



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## BIRTH AND REARING OF ELEPHAS MAXIMUS, Continued

eating the soft fruit until he was four months old. At six months he was eating grain and at eight months, bits of hay. It wasn't until he was a year old that he began to taste the different vegetation found on the paddock. He basically learned what and how to eat by watching his mother and testing her food by placing his trunk in her mouth.

Seetna slowly started to wean Spike in the fifth month. She decided when he could nurse and there were many times when she would not let him drink. Spike would protest by screaming loudly and running from teat to teat. He would also instantly latch on to one of her teats after someone or something had frightened him. His stool remained a slate gray color and of soft consistency until he was close to a year old. Now at a year old, it has an elephant dung shape and is brown in color.

Over the months, Spike went through many changes. Up to his ninth month, he looked as if he was wearing skin two sizes too big for him. It wasn't until then that he finally filled out. He also developed milk tusk by his seventh month that were about an inch long and needle sharp. They were discovered missing at the end of his first year. His eyes gradually changed as well from a baby blue to a dark gray-blue eventually to the brown color. Spike imitated his mother in many ways. Before he reached six months old, he was still crouching under his mother and using her belly as a means of shade. He also played by running around her body and then under her frantically as if something was chasing him. This halted at six months of age because he was too tall and he would scrape against Seetna's swollen breast. Soon he learned through imitating his mother that he could keep cool by loosening dirt with a front foot and throwing it on his back with his trunk. Spike has always been an excellent swimmer and would make frequent trips to the pool in one day. At first he never ventured in the water without his mother, but as he matured he would insist on her coming in with him by screaming at the top of his lungs. Spike used his trunk like a snorkel instinctively, but would splash in the water like a young child. He also would plunge into the pool from the deep end and bob up and down in the water like a dolphin.

The public is always well entertained whenever Spike is in the water. As Spike became more independent, he had the bad habit of walking too close to the edge of the paddock. Fortunately, the moats are sloped gently with soft, thick sod. When Spike fell in, Seetna calmly climbed to the bottom and dug a trench up along the hill with her front feet. When she reached the top of the yard, she'd crouch down and lay her trunk along the path to act as a guide for the calf to follow. When he came into her reach, she would continue to help him by pulling him up with her trunk. Anytime after those two occasions, if he got too close to the edge Seetna would promptly kick or slap him away and would not allow him to walk on the moat side when they strolled together.

Communication between mother and calf varied between throat vocalizations, trunk blowing and feet shuffling. I also suspect that other body language is used that we are not even aware of, but those were the most obvious. Spike's vocalizations changed as he progressed. He never was a quiet calf and whenever he bellowed it was at first a high pitched yelp which eventually turned into a deeper rumble. Spike discovered when he was seven months old that if he yelled for help, mother came running. He used this as an attention getter and finally Seetna stopped running up and now just glances in his direction. He also learned to trumpet with his trunk at seven months of age. We believe he acquired this skill while playing in the water. The first few month's of Spike's life he was never allowed to stray far from his mother's side. As he matured, he was found further and further away. After he passed that forbidden boundary, she

## BIRTH AND REARING OF ELEPHAS MAXIMUS, Continued

would position her feet or body a certain way and the calf would be back at her side within seconds. He immediately knew what his mother was conveying to him, but many times it was a secret language to us.

Spike can be easily described as a happy calf. He is interested in everything, especially the elephant keepers. We tried not to interfere with his rearing so there has been little interaction. He seems totally content to swim, chase birds and mock charge the public across the moat. We plan to pull him from his mother in the near future for already he is portraying the characteristics of a head strong bull. We also hope to be blessed with many more healthy calves as soon as we get the parents back together.

### THE BREEDING COUPLE (*Elephas maximus*)

In 1967, Ralph Scott, philanthropist and Florida Zoological Society member, delivered two Asian elephants to the Crandon Park Zoo. As a token of friendship from royalty, both Dahlip and Seetna arrived in good health from Nepal, India through the assistance of Pan Am airlines. The elephants ages were estimated to be one and a half years old. Senior keeper Bill Doss has been with them since the age of three years during which time rearing and training were his main responsibilities. Also in the elephant area at that time was a teenaged Asian cow who was donated by a wealthy family in Miami who had raised the animal as a family pet. Surprisingly, Dixie was very well behaved and mothered the young calves until her death a few years later due to a foot related problem.

Courtship and breeding began in 1974 when both elephants were well over eight years old. It wasn't until the fall of 1975 before Seetna finally conceived. About one year later she began to lactate and refused to allow the bull in the same enclosure. Actual copulation was always more frequent during the summer months and usually in water. The advantage of the elephant exhibit at the old Crandon Park Zoo was the natural canal which flowed through the park and partly served as the elephant pool. The canal was over ten feet deep, 300 yards wide and 600 yards long. Another asset was the soft muddy bottom found under the brackish water. The paddock itself had a sandy surface, like the new exhibit, and since most of South Florida's soil is made up of coral rock, it acts as a natural abrasive which keeps their feet in fairly good condition. The moist climate found here throughout the year also helps prevent toenails from cracking.

Crandon Park Zoo's first elephant birth occurred on 2 April 1977. The male calf's birth was not witnessed but there was an "elephant watch" in progress at the park that evening and the head keeper was called in to assist the new mother. She was eleven years old at the time of "Rocky's" birth. Since the baby refused to nurse from day one, the 24-hour-a-day "elephant watch" continued so that the general condition of the calf could be monitored. Elephant keepers desperately tried to get the calf to suckle from a bottle but were unsuccessful. Crandon Park Zoo administrators consulted with zoo officials from other zoological parks, including the Portland Zoo where, at that time, the only successful Asian elephant births had occurred. It was also discovered at that time, that out of a total of seventeen Asian elephant births at the Portland Zoo, five babies had refused to nurse and none of these could be successfully bottle-raised. In spite of all the personal and medical attention, the baby's condition gradually worsened and he died when he was only eighteen days old. A necropsy revealed that the calf died from a hemorrhagic colitis.

BIRTH AND REARING OF ELEPHAS MAXIMUS -- The Breeding Couple, Continued

TABLE I  
Growth and Development of Elephas Maximus

1st Month	: 200 pounds in weight, 37 inches shoulder height, eyes blue and sight poor, spine V-shaped, uttered high pitched squeals, nursed constantly at 10 second intervals, slept 18 hours a day, learned to swim five hours old, used trunk sparingly, began to flap ears;
2nd Month	: 300 pounds in weight, 39 inches shoulder height, eye color started to change, spine curved, plays with trunk;
3rd Month	: 400 pounds in weight, 41 inches shoulder height, skin appears baggy on his frame, begins to stray a little from mother's side, interested in keepers and surroundings;
4th Month	: 500 pounds in weight, 43 inches shoulder height, testing food, mock charges keepers, naps shortened from 50 to 20 minutes, vocalizations become deeper;
5th Month	: 600 pounds in weight, 45 inches shoulder height, moved to new zoo--seems more independent, interacting with keepers more, mother started to wean calf, eating soft fruit;
6th Month	: 700 pounds in weight, 47 inches shoulder height, because of his height, was not allowed to run under mother's belly, swimming by himself, discovered if he yelled for help mother would come running--yelled constantly;
7th Month	: 800 pounds in weight, 49 inches shoulder height, trumpeted for the first time, discovered milk tusks breaking through;
8th Month	: 900 pounds in weight, 51 inches shoulder height, eating fruit, grain and bits of hay, nursing less, day naps ended;
9th Month	: 1000 pounds in weight, 53 inches shoulder height, filled out completely, no baggy look;
10th Month	: 1100 pound in weight, 55 inches shoulder height, chasing birds, challenging public across moat;
11th Month	: 1200 pounds in weight, 57 inches shoulder height, eating a lot of hay, found on opposite end of paddock from mother;
12th Month	: 1300 pounds in weight, 59 inches shoulder height, lost milk tusk, stool firm square shaped and brown in color.



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# Legislative News

Compiled by Kevin Conway

## FLOOR/COMMITTEE ACTION

On 9/20/82, the Senate agreed to the conference report on HR6133, amending the Endangered Species Act and authorizing funding at current levels through fiscal 1986 to protect rare plants and animals.

---Conservation Report

## REVIEW FOR WILDLIFE CLASSIFIED AS ENDANGERED OR THREATENED IN 1977

The Endangered Species Act of 1973, as amended, requires the USFWS to conduct a review of all listed species at least once every 5 years. The purpose of this section is to insure that the listing accurately reflects the most current status of the listed species. In order to aid the Service in discharging this responsibility, the Director is requesting from any party comments and appropriate data which might document the need to delist or reclassify any of the selected species. If as a result of this review, the present classification of Endangered or Threatened is not consistent with current evidence, the Director will propose changes in such classifications accordingly.

Comments must be received no later than January 25, 1983. Submit comments to Regional Director [FA], Fish and Wildlife Service, Suite 1692, Lloyd 500 Building, 500 NE Multnomah St., Portland, OR 97323 [species 1,2,3,4, 6,17,18,19,20] or Regional Director [FA], Fish and Wildlife Service, Richard B. Russell Federal Bldg., 75 Spring St. SW, Atlanta, GA 30303 [species 5,7,8,9,10,11,12,13,14,15,16]. For further information contact: Mr. John L. Spinks, Jr., Chief, Office of Endangered Species, Fish and Wildlife Service, U.S. Dept. of Interior, Washington, D.C. 20240 (703) 235-2771. (Note: Affected species are listed on following page.)

## Definitions:

The following definitions are provided to assist those persons who contemplate submitting information regarding the status of the listed species:

(1) "Critical Habitat" means (a) the specific areas within a geographical area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (1) essential to the conservation of the species and (2) which may require special management considerations or protection, and (b) specific areas outside the geographical area occupied by a species at the time it is listed upon a determination by the Director that such areas are essential for the conservation of the species.

(2) "Endangered" means any species which is in danger of extinction throughout all or a significant portion of its range.

(3) "Species" includes any species or subspecies of fish or wildlife or plant and any distinct population segment of any species or subspecies of a vertebrate which is capable of interbreeding when mature. A species is determined to be Endangered or Threatened because of any of the following factors:

(a) The present or threatened destruction, modification or curtailment of its habitat or range,

(b) Overutilization for commercial, sporting, scientific or educational purpose,

(c) Disease or predation,

COMMON NAME	SCIENTIFIC NAME	HISTORIC RANGE	STATUS	WHEN LISTED
Mammals:				
1. Otter, southern sea	<i>Enhydra lutris nereis</i>	West coasts U.S.A south to Mexico (Baja, CA)	T	1/14/77
Birds:				
2. Mallard, Marianas	<i>Anas oustaletii</i>	West Pacific Ocean (Guam, Marianas Islands)	E	6/2/77
3. Shrike, San Clemente loggerhead	<i>Lanius ludovicianus meamsii</i>	U.S.A. (CA)	E	8/11/77
4. Sparrow, San Clemente sage	<i>Amphispiza belli clementeae</i>	U.S.A. (CA)	T	8/11/77
Reptiles:				
5. Anole, Cuban giant	<i>Anolis roosevelti</i>	U.S.A. (P.R. Cuelbra Is.)	E	7/21/77
6. Lizard Island night	<i>Klauberina hiversiana</i>	U.S.A. (CA)	T	8/11/77
7. Lizard, St. Croix	<i>Ameiva Polops</i>	U.S.A. (Virgin Islands)	T	6/3/77
8. Snake, Atlantic salt marsh	<i>Nerodia fasciata taeniata</i>	U.S.A. (FL)	T	11/29/77
Amphibians:				
9. Coqui, golden	<i>Eleutherodactylus jasperi</i>	U.S.A. (Puerto Rico)	T	11/11/77
10. Treefrog, Pine barrens	<i>Hyla andersoni</i>	U.S.A. (FL,AL,NC,SC,NJ)	E	11/11/77
Fishes:				
11. Cavefish, Alabama	<i>Speoplatythinus poulsoni</i>	U.S.A. (AL)	T	9/9/77
12. Chub, slender	<i>Hybopsis cahnii</i>	U.S.A. (TN, VA)	T	9/9/77
13. Chub, spotfin	<i>Hybopsis monacha</i>	U.S.A. (AL,GA,NC, TN, VA)	T	9/9/77
14. Darter, slackwater	<i>Etheostoma boschungii</i>	U.S.A. (AL,IN)	T	9/9/77
15. Madtom, yellowfin	<i>Noturus flavipinnis</i>	U.S.A. (GA,IN,VA)	T	9/9/77
Clams:				
16. Riffle shell clam, tan	<i>Epicoblasma walkei</i>	U.S.A. (KT,TN,VA)	E	8/23/77

(Plant species are not included in this AKF Listing)

LEGISLATIVE NEWS, Continued

- (d) The inadequacy of existing regulatory mechanisms, or
- (e) Other natural or man-made factors affecting its continued existence.

(4) "Threatened" means any species which is likely to become Endangered within the foreseeable future throughout all or a significant portion of its range.

Effects of Review:

If substantial evidence is available to the Service or is presented by any party for one or more of the listed species, the Director intends to propose new rules that would do any of the following: (a) Reclassify a species from Endangered to Threatened, (b) Reclassify a species from Threatened to Endangered, or (c) Remove a species from the Threatened or Endangered Wildlife List. Distinct geographic populations of vertebrate species as well as subspecies of all wildlife species may be proposed for either separate reclassification to a different status than the presently listed species or removal from the list. If no substantial data are available or presented to suggest a status change for a particular species, then the next formal status review for that species will be announced no later than 5 years hence.

Once a species has been determined to be Threatened or Endangered, the Act imposes certain restrictions on activities involving the species. Generally, it is unlawful for a person subject to the jurisdiction of the U.S. to take an Endangered species of fish or wildlife or to engage in foreign and domestic commerce involving an Endangered species or its parts or products. The Director has discretion in determining whether the taking and commercial restrictions will be made applicable to Threatened species of fish or wildlife by 50 CFR 17.31. As a general rule, the taking and commerce restrictions applicable to Endangered species of fish and wildlife are made applicable to Threatened species by 50 CFR 17.13. However, the Director does promulgate special rules for some species, varying the taking and commerce prohibitions.

Public Comment Solicited:

The Director requests that any comments concerning the status of the listed species be submitted. Comments from the public, other concerned governmental agencies, the scientific community, industry, or any other interested party are hereby solicited. Such comments must be in writing and should contain the name, signature, address, telephone number and the association, if any, of the party.

Receipt of all comments will be acknowledged in writing by the Service. If significant data are available warranting a change in a species' classification under the Act, the Director will propose a rule to modify the present status of the listed species. In order to determine if the comments contain significant data, the Director will consider whether the document:

(1) Clearly indicates the scientific and any common name of the species involved;

(2) Contains a detailed narrative describing, as appropriate, the past and present numbers and distribution of the involved species, subspecies, or distinct vertebrate geographic population; the particular threatening factors affecting the species; and, if appropriate, the features and importance of any Critical Habitat;

(3) Is accompanied, as appropriate, by supporting documentation, such as maps, a list of bibliographic references, reprints of pertinent publications, or copies of written reports or letters from authorities; and

(4) Does not essentially repeat scientific, commercial, or other relevant information already cited by the Director in an earlier rulemaking process or notice of review.

---Federal Register



# The Endangered Species Act .....AN UPDATE

## PRESIDENT SIGNS REAUTHORIZATION FOR ENDANGERED SPECIES ACT

On 20 October, the President signed into law the Reauthorization of the Endangered Species Act for three years. The new law will

- § ensure that decisions in every phase of the listing process are based solely upon biological data.
- § direct the Secretary (of Commerce or Interior) to designate critical habitat at the same time a species is listed (to the maximum extent prudent).
- § give the Secretary an additional year in which to deisgnate critical habitat if it cannot be determined at the time of the listing.
- § direct the Secretary, within one year of receipt, to review all petitions for listing or delisting (when they present substantial information) and to determine if the action requested is warranted.
- § require the Secretary to submit a written report to Congress if the U.S. votes against the inclusion of a species in Appendix I or Appendix II of CITES and if the U.S. does not enter a reservation with respect to that species. Such a report must specify the reasons why a reservation was not entered.
- § allow for experimental populations. These must be authorized by the Secretary for release outside the current range of the species and are limited to those introduced populations which are wholly separate geographically from non-experimental populations of the same species. All experimental populations will be given protection provided for threatened species.

---K. Vehrs  
AAZPA Newsletter



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## INTERNATIONAL FOODS CO. FUNDS RAPTOR NUTRITION STUDY

*Submitted by Craig Larmon*

International Foods Company is pleased to announce the funding of a one-year research project for the study of prepared diets and raptor nutrition to be conducted by the Raptor Rehabilitation and Propagation Trust, Inc., located at Tyscon Research Center, Washington University, St. Louis, MO. This closely controlled and monitored research project will test the performance of the company's prepared Bird of Prey diet against conventional feeding programs. All phases of raptor development will be measured including growth, maintenance, breeding and hatching.

THE LITTLE ROCK ZOO PRESENTS:  
"IT'S ALL PART OF A ZOO KEEPER'S LIFE"

Music & Lyrics By: *Chris Rasums*  
Reproduced By: *Russ Bell*

Typed By: *Pat Carter*  
Projector Operator &  
Kazoo Maestro: *Kelli Westbrook*

Constructive Criticism Committee:  
*David Westbrook, Juri Rasums, Kelli Westbrook & Dudley Rasums*

Moral Support Provided By: *Liquid Assetts, Little Rock, Arkansas*  
Photography By: *Chris Rasums*  
Copyright 1981 ©

Cleanin' drains and feedin' critters  
Gettin' bit gives me the jitters  
Workin' every day thru storm and strife  
Rain or snow or sunshine even  
It don't matter I ain't leavin'  
It's all part of a zoo keeper's life

It don't matter I ain't leavin'  
Cause it's all part of a zoo keeper's life

Big red monkeys swingin' on a rope  
They might think that I'm a dope  
But I don't get too close don't you know  
We gotta be so hale and hardy  
Nicky and Chelsea can throw me a party  
Just as long as a party's all they throw

It don't matter I ain't leavin'  
'Cause it's all part of a zoo keeper's life

Ellen says that she ain't movin'  
Even if we're sweet and soothin'  
She ain't budgin' till she gets some hay  
All the pleadin' we can muster  
Call the cops and let them bust her  
She ain't movin' till we go away

It don't matter I ain't leavin'  
'Cause it's all part of a zoo keeper's life

Now Ginny she's a different story  
But I don't want to get too borey  
She's a dear and she'll bite off your arm  
But that's why we've got senior keepers  
Don't they know by golly jeepers  
It's their job to keep us out of harm

It don't matter I ain't leavin'  
'Cause it's all part of a zoo keeper's life

Just because we like to sweat  
Gettin' dirty soakin' wet  
Cause we love the pain and misery  
We'll be found with hands in dirt  
There's deer manure on my shirt  
And there's a camel walking over me



"IT'S ALL PART OF A ZOO KEEPER'S LIFE", Continued

It don't matter I ain't leavin'  
'Cause it's all part of a zoo keeper's life

When you whistle they come runnin'  
Food and play's just part of funnin'  
Always beggin' something from your hand  
Give 'em grass and they'll make mud  
Give 'em treats and they'll draw blood  
Munchin' their way thru life is simply grand

It don't matter I ain't leavin'  
'Cause it's all part of a zoo keeper's life

Everybody laughs when the vet gets chewed  
Don't let that be misconstrued  
It's just because we like her on our team  
We'll protect her from the lion  
We don't need her dead or dyin'  
She's of use until we hear her scream

It don't matter I ain't leavin'  
'Cause it's all part of a zoo keeper's life

Our boss comes daily once or twice  
With unsolicited advice  
Hope he doesn't find me hidin' out  
Underneath the willow tree  
With a pregnant Dama wallaby  
He'd just love to help me there's no doubt

It don't matter I ain't leavin'  
'Cause it's all part of a zoo keeper's life

Just this mornin' it was warm  
Now I'm in a thunderstorm  
Knowin' I won't dry out till tonight  
But I think I can rise above it  
Lovin' every minute of it  
Keepers ain't been known for bein' bright

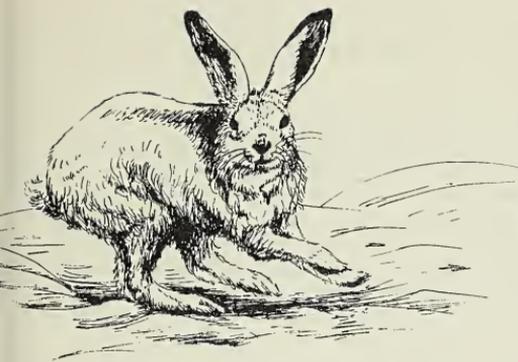
It don't matter I ain't leavin'  
'Cause it's all part of a zoo keeper's life

Scouts come out on Saturdays  
Docents help so many ways  
Adding to the crazy atmosphere  
But if they're not real careful tho'  
Even though we tell 'em so  
Whoops there goes another volunteer

It don't matter I ain't leavin'  
'Cause it's all part of a zoo keeper's life

Cleanin' drains and feedin' critters  
Gettin' bit gives me the jitters  
Workin' every day thru storm and strife  
Rain or snow or sunshine even  
It don't matter I ain't leavin'  
'Cause it's all part of a zoo keeper's life





## HARE RAISING EXPERIENCE

By  
Kevin Moore  
Animal Curator/Assistant Manager  
Salmonier Nature Park  
Newfoundland

Hares in general are not common display animals in many zoological parks. Most institutions prefer the more docile rabbits. However, at Salmonier Nature Park our prime mandate is to educate our visiting public about native Newfoundland and Labrador species - thus we must exhibit the introduced and widely common snowshoe hare (Lepus americanus) and the native, but fairly scarce arctic hare (Lepus arcticus).

The search for resource material on arctic hares began six years ago just before the species was first brought to the park. Literature was consulted with only minor success. Nothing was available on the species in the wild. Other institutions were contacted and more recently requests for information placed in the CAZPA and AAZPA newsletters. This has resulted in some new information on hares but very little on arctic hares. The ISIS inventory has consistently shown no other institution other than Salmonier holding this species.

With little background to go on our efforts have had to proceed primarily with extrapolations from other species. One species that was particularly useful was Lepus timidus in Europe. Some taxonomists consider this species synonymous with Lepus arcticus.

I would like to quickly outline what Salmonier Nature Park has done in terms of maintaining and displaying arctic hares emphasizing some of the husbandry items that we feel are of special importance.

### TRANSPORTATION

With only a few exceptions all of the arctic hares brought to Salmonier have come from Brunette Island. This is a small island off the southeast coast of Newfoundland and only 11 miles from the French territories of St. Pierre and Miquelon. Arctic hares are not native to Brunette, but four were introduced there in 1969 by the Wildlife Division. In less than ten years the population has reached 1,500 animals. This has provided the base for continued studies of arctic hare populations. The park has been able to obtain some of the overpopulation from this island. Animals have been occasionally brought to the park by helicopter, but usually a one-hour boat trip followed by a 2½-hour care ride is necessary.

For all of this travel arctic hares do not appear to develop immediately obvious stress problems as do snowshoe hares. This may be due to the mild nature of the animals and how well they tolerate the closeness of man. We have had only one arctic hare go into opisthontonic convulsions which was corrected with a 3cc injection of dextrose and by also placing the animal in a darkened box on a heating pad. However, stress related problems do occur several days or weeks after transit and these will be discussed when we consider animal health problems.

## HARE RAISING EXPERIENCE, Continued

### ENCLOSURES

At Salmonier we normally place incoming small animals into two metre square by three metre high holding cages for initial examination. This has proved unsatisfactory with arctic hare. Hares are a flighty group and impact with the sides of the cage was not uncommon. Injuries occurred as well as some deaths. The problem with small cages was also experienced by a Wildlife Division Technician who lost 14 of 41 females captured just prior to parturition that were held in small cages in an attempt to determine litter sizes.

Although cage size is only one factor, we felt that it was an important one. Thus arctic hare become the only small animals immediately released into their enclosure upon arrival at the park. With this change, our success rate rose. At first we used one of our 10m x 16m enclosures and this proved quite satisfactory. Eventually, it was decided to try a multi-species exhibit and display the hares with woodland caribou. A 335m by 46m enclosure was divided into two sections with the caribou alternating bi-weekly between halves and the hares restricted to one side. Damage to the enclosure was minimal although some girdling of trees occurred. As most taste aversion solutions contain compounds toxic to wild avian species or are too colorfully dyed, we used a pruning paint/sand mixture to prevent damage to trees. This worked very well until snow cover became so deep that the hares could reach above the paint. We lost several trees this way.

Numbers and percentages of sexes of hares in enclosures have varied but ideally we would like to have two females and one male on display. However, we have usually had additional males in our enclosure up to a total of three males and two females. Harrison and Fowler (1978) note that typically male lagomorphs have to be removed from other males after eight weeks of age due to aggressive behavior.

We have not noticed this in arctic hares, possibly as they are such a gregarious species. Doris Walsh, as a Memorial University of Newfoundland honor's thesis, did comparative behavioral work on captive arctic and snowshoe hares at Salmonier Nature Park. In the 10 by 16 metre enclosure, she studied two females and three male arctic hare and found that 85% of all aggressive behavior was female to male and 12% was female to female. The remaining 3% was male to female or male to male aggression. As well, in relation to grooming behavior, 23% of all social grooming was male to male. It should be noted that both social grooming and aggressive behavior dropped significantly as the animals adjusted to the enclosure. Also most aggression was caused by one female who possibly could have been removed. Severaid (1945) noted the role of an individual animal in aggression in snowshoe hare and stated that "Ninety percent or more of individuals regardless of sex, can be expected to tolerate one another, even under the degree of confinement in this study (4' x 4½')." "

### DIET

It is difficult to obtain information on the diet of arctic hares in the wild especially for the southern races. Winter food for northern races appears to be primarily tundra shrubs especially arctic willow (*Salix arcticus*). In summer a greater variety is eaten although willow still plays an important role (Wanf et al 1973, Parker 1977). Examining *Lepus timidus* references, we see that willows are also preferred and in some areas birch is equally preferred (Lindlof et al 1974b, Pulliainen

## HARE RAISING EXPERIENCE, Continued

1972) although in other areas it isn't (Lindlof and Pehrson 1978). Lepus timidus is reported to selectively graze heather rich in nitrogen in summer and rich in nitrogen and phosphorus in winter (Miller 1968). High levels of crude protein were also selected (Lindlof et al 1974)

In Newfoundland there has been no definite studies although general observations rate willow and birch highly. At Salmonier we did some crude testing of browse selection. Birch was preferred over willow while alders Alnus sp. and shrubs, mainly Vaccinium were left untouched. Alder may have been avoided due to possible antibiotics in alder resins that have been shown to upset vitamin production and digestion in snowshoe hares (Bryant 1981). However, birch resins are reported to do the same.

Any notes on captive diet for arctic hare usually include commercial feed (Wang et al 1973, Finaly 1978) as well as some birch browse or vegetables. At Salmonier we provide commercial rabbit chow (Supersweet Rabbit Pellets 16%, #706) along with a selection of browse almost exclusively birch on a free choice basis. In addition, the animals have free access to mineralized cobalt salt licks. B vitamins and vitamin C are added to their drinking water.

### ANIMAL HEALTH

Past records of arctic hare health problems and necropsy results at Salmonier Nature Park have been poor. Most of the existing information has come in the last few years. In general, arctic hares are likely susceptible to many if not all of the problems associated with other lagomorphs.

Most importantly at Salmonier has been the stress effects of transportation on animals several days to weeks after the hares' arrival at the park. Necropsies have revealed internal hemorrhaging especially in the intestine and often associated with bacterial infections due to a partial collapse of the defense system due to stress. Antibiotics cannot be used due to their effect on important hare cecum fauna necessary for digestion. To help alleviate transit shock problems, as mentioned earlier, B vitamins and vitamin C are maintained at high levels in the hare's drinking water.

After the animals have adjusted to captivity, our next major concern is coccidiosis. Although we have had only one reported occurrence in an arctic hare here at the park, it is a problem that is widespread in most lagomorphs. All feed and water pans are kept extremely clean and the enclosure kept as clean as possible of feces. Unfortunately, all of our enclosures have vegetated ground cover and it is impossible to be as clean as we would on an artificial substrate. We have attempted to counteract this problem by adding sulfamethazine to the hare's drinking water in addition to what is already added to their commercial feed.

No ecto parasites have been found on our hares although some flies will lay eggs on the surface of the skin almost immediately after death of a hare. Parker (1977) reported only one parasite, a flea Hoplopsyllus glacialis glacialis, during his study. Only one internal parasite has been found in arctic hare at Salmonier and this is the nematode Strongyloides papillosis. This was treated with Thiabendazole. We could find no reference of other internal or external parasites that infect arctic hare. However, it could be assumed that parasites infecting snowshoe hares in Newfoundland could infect our arctic hares as well.

## HARE RAISING EXPERIENCE, *Continued*

Another concern has been predation. With open natural enclosures we have occasionally suffered losses usually snowshoe hares or ducks. This year we lost two arctic hares, one small and one full-grown adult to an owl. As an adult arctic hare can weigh upwards to 4.6 kilograms, this is indeed a large kill for a 1.5 kilogram great-horned owl.

### BREEDING

As with other aspects of arctic hare husbandry, little is known about breeding in captivity or in the wild especially with the various subspecies. Information tends to be general observations as compared to any detailed studies.

Lepus timidus and snowshoe hares have been captive bred relatively easily but we can find no published record of arctic hare births in captivity.

In general terms, mating is suspected of beginning in early April, with a gestation period of approximately 45 days in Newfoundland. In other areas this information varies with subspecies and location. Most references give mid to late June as normal parturition dates although in Newfoundland, Finlay (1978) found that all his births occurred between May 20-25. It is thought that arctic hares may have two litters a year. The average litter size in Newfoundland is three. Weaning occurs early in hares although Parker (1972) found hardened chunks of milk in juvenile stomachs approximately 22 days after the average parturition date in his area.

At Salmonier Nature Park, we set aside an area off-display to attempt captive breeding. This area is 900 square metres with a 2½ metre high fence. Roughly two-thirds of the enclosure is second growth balsam fir forest while the remainder was more open. The bulk of the floor clutter was left to provide cover from predators while a number of wooden "forms" were provided to protect from weather. Three males and three females were placed together in this enclosure in late August 1981. Within days of these animals being placed in the enclosure, one animal died from stress-related causes and the other - the smallest adult, disappeared, likely with the help of a great horned owl. The remaining four did well over the winter even though we had low temperatures with much snowfall.

On 1 June, 1982 a suspected birthing form was found and a search was begun for the young hares. The first two found were dead and we suspect stillborn. The genitals of one had been eaten by a shrew but likely after death. However, three other hares were found at different parts of the enclosure well furred and eyes open. At no time in the subsequent days or weeks were any of the adult hares seen near the young leverets so no information concerning weaning or maternal behavior was observed.

The leverets grew rapidly and within two weeks were half the size of the adults and by two months of age were almost indistinguishable. Forty-five days after birth all hares were moved from their breeding areas to the display area that they share with the woodland caribou. With the exception of one escape and its subsequent recapture the animals have done well here and the young hares have been excellent exhibit animals feeding only feet from the visiting public.

This winter we plan to place half of our animals back into the breeding area and leave half in the main display enclosure. Hopefully, new births

## HARE RAISING EXPERIENCE, *Continued*

will soon swell our numbers so that we will have surplus animals to supply to other institutions. For zoological parks that have polar regions with polar bear, arctic fox and snowy owls but no hares, we hope the acclimatized young will be a welcome addition.

### BASELINE DATA

#### ARCTIC HARE (*Lepus arcticus*)

Temperature	38.9°C (39,0-40.8)	Wang et al (1973)
Longevity (in wild)	Unknown	
Longevity (in captivity)	16 months	Salmonier Nature Park
Measurements	Length: 658mm F/634mmmm Tail: 69mm F/66mmmm Hindfoot: 158mm F/158mmmm Ear: 70-84,, F&M	Banfield (1974)
Weight	3004g 3400-4900g 4.6 kg	Wang et al (1973) Northcott (1974) Banfield (1974)
Breeding Date	Early April (Nfld.) April-September (possible)	Finlay (1978) Banfield (1974)
Gestation	45 days 53 days	Mercer et al (1979) Parker (1977)
Parturition Date	June 20 May 20-25 June 10 (and later) June 1	Parker (1977) Finlay (1978) Banfield (1974) Salmonier Nature Park
Weaning Date	Unknown	
Nutritional Requirements	Unknown	
Daily Energy Consumption	262 to 133 kcal (at -24°C to 12.5°C) Reduced thermal conductance Reduced BMR	Wang et al (1973)

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## Information Please

I am interested in doing behavioral research on spider monkeys (Ateles Geoffroyi). We have recently moved our group (2.6) inside winter quarters. They now have a smaller area, less sunlight and no outside stimuli other than contact with keepers. I would like to find a way to combat and hopefully eliminate the apparent "boredom" I have witnessed during previous winter confinements. Anyone having suggestions, behavioral information, etc. please contact: Diane C.M. Forsyth, Akron Zoological Park, 500 Edgewood Ave., Akron, OH 44307.

## WINTERIZING OF THE AFRICAN SAVANNA BIRDS

By

*Debbera Stecher, Savanna Unit Keeper  
Woodland Park Zoological Gardens  
Seattle, Washington*

### INTRODUCTION

The city of Seattle, although known for its rain, only received a total of 35.4 inches of rainfall in 1981. From November to April our average low temperature was below 50°F, and we do have occasional snow.

The Woodland Park Zoo's African savanna is an enclosure of 80,500 square feet, and is home for a large number of tropical species, including giraffes, zebras, springbok, secretary birds, crown cranes, Egyptian geese and common guinea fowl. Because the zoo personnel consider winter weather conditions unfavorable to a large number of these tropical species, especially birds, several design modifications have been incorporated into the facility to assure species survival during inclement weather.

### CROWN CRANES

The crown crane holding cages were the only existing shelter available for birds. Three separate runs were built into a cement wall on the northeast side of the Savanna, west of the hippo corral. The stalls are heated by overhead heat lamps. Smoke-colored plexi-glass sliding doors separate each stall; these can be propped open to make one large run. The front doors are made of wire mesh with wooden slats inserted in the mesh to keep out cold air and rain. The floor is covered with wood shavings to prevent frozen feet during snow and very cold weather.

### KORI BUSTARDS

The pair of kori bustards presented some special problems. These included a) the obvious need for protection from the elements, b) the need for privacy during nesting, c) the need to separate the male and female for a two-month period during the winter, and d) protection from crows during incubation and feeding.

The kori bustard's territory is the northwest corner of the Savanna. This area is bordered by the Patas exhibit on one side and a fence on the other, forming a triangle in the northwest corner. This area was designated as the nesting area, and with some modifications, sealed off from the rest of the exhibit by a fence and gate. For protection from the elements, a wooden triangle-shaped lean-to was installed; it is open from the front, but solid on all other sides. An electrical conduit was run to the area to provide heating. Burlap was hung on the fence between the main exhibit and this area, with a small opening along the fence to allow access. The size of the opening is adjustable and can be secured during the separation period. A crow-proof feeder hangs inside the fence; an additional hole was put in the back wall of the feeder and fence to allow keeper access without entering the area. A net covers the area for additional protection from crows. This is off-view from the public.

### SECRETARY BIRDS

The pair of secretary birds were also without an existing holding area.

## WINTERIZING OF THE AFRICAN SAVANNA BIRDS, *Continued*

Due to their ability to out-run their keepers, and because, unlike cranes, they cannot be herded into a holding area, it was decided to construct a feeding station on the Savanna with heat, food and weather protection. A lean-to was constructed next to the fence in the southeast corner of the Savanna. The roof of the structure is clear ribbed plastic mounted on a wooden frame, providing a spacious feeling that these timid birds need. The four support poles (2" x 4") are buried two feet in the ground. The side closest to the fence is two feet shorter than the front. The front side is covered by wood from the top to just two feet from the bottom, giving wind protection. Gravel is spread under a wooden board (4' x 5') and covered with burlap to protect the birds' feet and give them a good substrate. An electrical conduit was installed nearby for the two heat lamps that go under the lean-to, and a crow-proof feeder occupies the area under the lean-to next to the fence.

### SAVANNA AVIARY

The Savanna aviary is located at the southeast corner of the Savanna. It is a six-sided structure encompassing 1,100 square feet, constructed with wooden support poles and wire mesh around the sides. The top and back of the exhibit are net. The entrance and exit have small ante-chambers, allowing passage through two sets of doors; this guards against bird escapes during visitor entrance. The theme is naturalistic. The visitor is enveloped in a different world of overhung trees, with a pond used by the Cape teal. Male weaver birds hang their bulb-like nests like ornaments from the tips of tree limbs.

Black-winged stilts walk among visitors, and Lilac-breasted rollers may circle overhead before suddenly diving for a cricket along the path's edge. The visitor can rest on a wooden bench and gaze into the distance at the main exhibit, to see the zebras and secretary birds, whose man-made nest is located in a gully just behind the aviary, almost hidden from view.

It was felt that the African passerine birds would not acclimate to Seattle's typical winters without a structure within the enclosure that could house heat lamps, perches and feeders. This structure would have to fit into the natural theme of the exhibit.

Two large wood poles located within the enclosure support the nets, but are otherwise unused. Dead trees were laid across the pond, resting on each pole. Metal feed bowl rungs were attached to both poles, away from the public's view, and the tree branches became natural perches.

On one pole a conical wooden roof was put up just covering the metal ring. On the other pole an old metal rat guard was modified to fit the diameter of the pole. Two heat lamps were then fitted under this metal hood. Both hoods were sealed with asphalt caulking, which is tar-like and waterproof. Leather brown spray paint added the finishing touch.

Over the exit door a metal lean-to was attached to the wire mesh with the help of two-by-fours, butts and bolts for support. Two existing light fixtures are used to heat this structure at one end only, to achieve temperature gradient. Tree branches were hung for perches. To minimize spillage and dropping in the walk-way, feed bowl rungs are hung at either end.

A lean-to similar to the one located above the exit door was built for

## WINTERIZING OF THE AFRICAN SAVANNA BIRDS, Continued

stilts and teal. The metal roof was attached to two wooden stakes and a heat lamp installed in one corner. The whole structure is wired to the wire mesh on the west side, or back, of the exhibit, 2-2½ feet off the ground.

The stilt and teal pans had to be located on the ground, yet still receive weather protection. Two artificial rocks were made: a 1" x 1½" wire mesh was used to form the hollow rock, and burlap strips soaked in Plastic-stone<sup>tm</sup> covered the wire mesh. When the stone hardened it had a realistic appearance. The rocks were placed at the edges of the ponds, and used to support food pans.

### CONCLUSION

After all the modifications had been implemented, we successfully exhibited birds on the African savanna the entire year. Once the birds adjusted to the feeding routine their intake was easily monitored. Cleaning, as always, is the major problem. Feces and food particles collect under feeding stations, making them prime spots for rodents and disease. Starting early in September, a strong rodent extermination program was implemented, so by winter the rodents were under control. Cleaning with disinfectants helps eliminate disease problems.

These modifications were completed in the fall of 1981. Finally, by early spring of 1982 we were successfully breeding masked weaver birds on exhibit, after their arrival in the spring of 1980. At present seven weavers have been added to our collection. All were parent incubated, and only one was hand-raised.

### ACKNOWLEDGEMENTS

I would like to take this opportunity to extend a special thanks to Carl A. Grandquist, Woodland Park Zoo keeper aide for his drawings of the modifications of the Savanna aviary and crow-proof feeders.

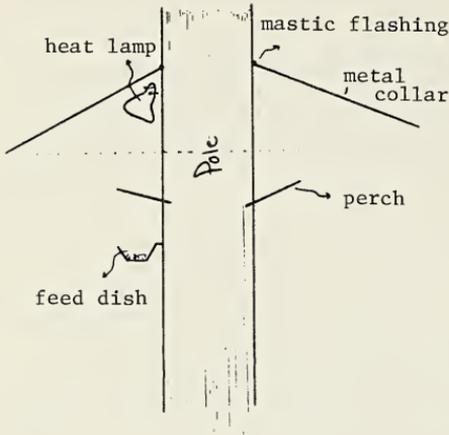
## WINTERIZATION OF AFRICAN SAVANNA BIRDS

These weather shelters were constructed with materials readily available, strong yet relatively lightweight. Where they were somewhat conspicuous, attempts were made to conceal them with vegetation. All were painted to blend with surroundings. All were installed where there were previously heat lamps and feeders. Ease of access for servicing remained good. The heat lamps are used in any colder weather.

Metal coverings were found superior to wood with regard to aesthetics, cleaning and durability, as well as heat retention.

These structures were well received by the birds and, after an initial adjustment period, caused no noticeable disruption in behavior or habit.

METAL COLLAR  
around pole

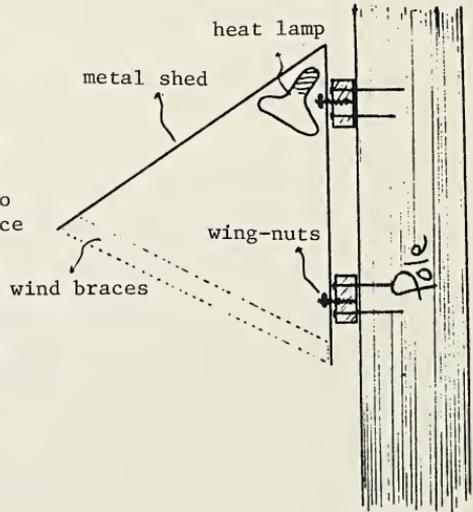


- collar adapted from an old metal rat guard
- fastened with common galvanized nails to pole
- mastic or caulk flashing
- entire surface of collar painted brown enamel
- feed dish and perch /rest installed where appropriate
- heat lamp typical, using existing outlet at base of pole
- entire fixture located about 7 ft. above the ground

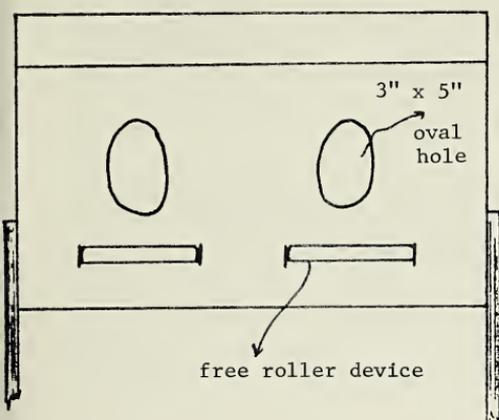
(mounted on an existing wood supporting pole)

METAL SHED  
over walkway

- fastened with "wing nuts" for easy removal, over entrance and exit pathway
- heat lamp typical; use existing outlet at base of doorway
- triangular plywood end-plates to close/seal inner heated air space
- heat lamps at one end only, to achieve temperature gradient
- feed dishes and/or perches at ends, to minimize spillage and droppings in walkway beneath
- brown enamel painted finish
- entire unit about 10 ft. in length and about 8 ft. above ground



(mounted on 2" x 4" cross supports to existing poles)



("Kori Bustard" & Secretary Bird")

- Essentially a plywood box but...

\* clear plexiglass cover, shed and hinged

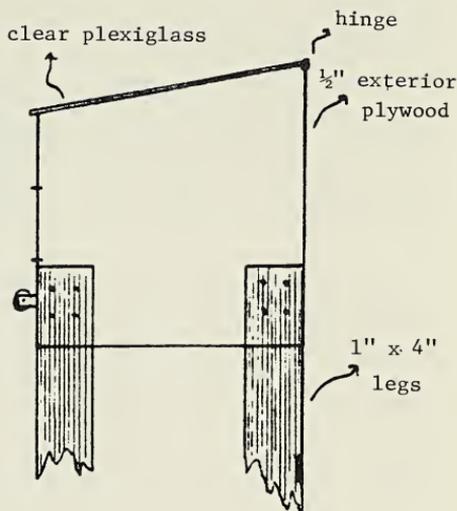
\* two oval openings, Kori's having roller fixture

\* legs made of 1" x 4" lumber, Secretary's mounted somewhat higher

\* entire structure needs to be fastened against something, such as a wire mesh fence

SHELTERED FEEDER

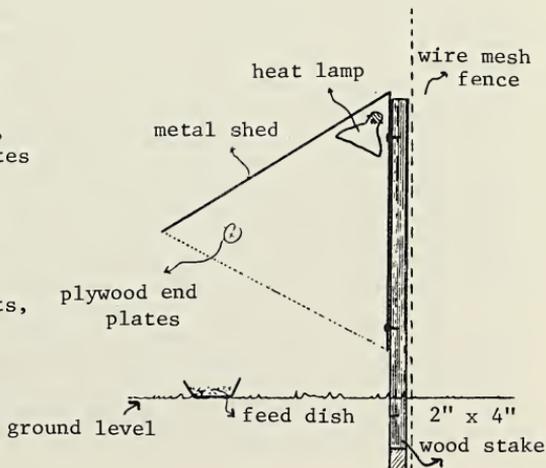
resistant to crows



METAL SHED

teal, stilts, etc.

- structure is at ground level
- fastened with roofing nails to the stakes, which are driven in the ground
- entire unit is about 4 ft. long, with triangular plywood end-plates to close/seal inner heated air space
- heat lamp typical; use existing outlet
- height adjusted for ducks, stilts, etc
- entire surface painted enamel brown



(mounted on 2" x 4" wood stakes)



HERPETOLOGICAL HOUSING AND THE  
USE OF NATURALISTIC INTERIORS



By  
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Reptile Breeding Foundation  
Picton, Ontario, Canada



Perhaps the best place to begin this paper is with a description of the abominable and inadequate conditions and caging in which reptiles and amphibians have been kept in the past. However, rather than dwell on what is wrong, let us look at how we as keepers of herpeto-fauna can improve the lot of these fascinating animals. For many years zoos and individuals believed that any simple box or cage could be used to maintain a snake, frog or lizard. In recent years, thankfully, this attitude has altered; it is not completely changed. There are many institutions and individuals who still house their animals under the bare minimum of requirements.

In the past few years there has been an increased interest in properly maintaining and propagating herpetofauna in captivity. With this increased interest has come: increased effort, increased success and regrettably, increased health and husbandry problems. Many of these problems are directly related to housing. Housing (or caging) is undoubtedly the single most important factor to be considered in the proper husbandry and maintenance of reptiles and amphibians in captivity. Housing broadly covers the actual physical structure of the cage, but more importantly includes the substrate, heat, lighting, humidity, and furnishings within the structure. At the Reptile Breeding Foundation we have initiated the use of some unique cage designs and housing facilities which I would like to share with you. In addition, I would like to make the case for creating as naturalistic a setting as possible for your charges.

The problems associated with properly housing reptiles and amphibians in captivity hinge on two main areas: first, the inadequacy of conventional cages for properly maintaining diverse species with equally diverse requirements, and two, the desire to provide aesthetic and naturalistic environments for good animal health. The possibilities for providing ideal environmental chambers, for each species maintained, are unlimited...so long as the funds available for such a venture are likewise unlimited. However, most of us work under very limited budgets and must rely on ingenuity (and occasionally: begging, borrowing and stealing) to attain our objective. Unless your zoo is contemplating the building, reconstruction or modification of its public exhibit cages for reptiles and amphibians, there is probably little that you can do to change the physical shape or design of the existing cages. There are, however, improvements which can be made to alter and modify, and thus improve the interior of these cages. At the Reptile Breeding Foundation we are not concerned with public displays owing to the fact that we are not open to the public, so we have not had to design this type of cage. However, I believe that many aspects of the cage designs which I will be discussing have potential for zoo exhibits, and all are applicable to off-display units.

Housing large numbers of young reptiles or other off-exhibit specimens has always been a bit of a problem. I'm sure that many of you continue to use any, and all, available containers, including aquariums ( of all different sizes and shapes; many of which are cracked), plastic shoe boxes, galvanized stock tanks, gallon jars, old washtubs, etc., etc., etc. With a

little ingenuity, and even a minimum amount of space, great things can be done to improve this, both aesthetically and for the benefit of the animals housed therein. The cage designs which we have experimented with at the Reptile Breeding Foundation should have practical application in almost any collection. All of these designs were relatively easy to construct or set up, none of them were expensive when compared to other units, and all are easy to maintain.

Two of these designs have been employed by us for over eight years. The first is utilized for the majority of our adult snakes and consists of plywood modular units with a sheet metal floor and front-opening door with a plexiglass window. These units can be constructed to almost any size. The second style is one which we use in our nursery to house baby snakes, and adults of the smaller species. This type of caging consists of a series of plastic boxes ( or tubs) placed on steel shelving units. The occupants of these cages can be observed through the sheet of glass, and the cage itself can be pulled out from under the glass, like a drawer, for servicing. We presently use three sizes of plastic tub: two are standard laboratory rodent cages, and the third is a plastic dish tub purchased from restaurant suppliers. We drill holes in both ends of these tubs for ventilation, but other than that they are not modified. The size and design of plastic tubs is only limited by their availability. The wooden units can also be drilled for added ventilation, and shelves, lights, branches, etc. added, if desired, for the species to be housed in them.

Both of these cage designs are heated by means of electrical heat tapes placed underneath the rear of the cages. The heat tapes are placed on top of asbestos strips (to prevent burning the surface below and to concentrate the heat up to the cage above). With the plastic tubs, there is a sheet of thin gauge sheet metal between the heat tape and the tub. This piece of metal and the metal bottom of the larger plywood cages act to evenly distribute the heat over the entire surface of the cage floor. However, by placing the heat tapes at the rear of the unit, we get a temperature gradient within the cage. In the case of the plywood units this is about 6°F gradient. The heat tapes are controlled by a thermostat pre-set at the desired temperature. These heat tapes are energy efficient, economical and quite reliable. The plastic tubs have the added advantage of being able to completely remove the cage, transfer the occupant to another cage, and then clean the original unit at your leisure, without unduly stressing the animal.

Our most recent cage design is one which was conceived for use by aboreal species (in our case, the lizard genus *Phelsuma*), so that we could provide a more vertically oriented environment which is not found in standard aquaria and terraria. We wanted to establish a large number of cages which could be confined to a relatively small area, which were easy to construct, which would be easy to clean, and which we could light with Vita-light florescent tubes and not hinder the transmission of Ultra-violet rays into the cage. The best choice for these units were 10 and 15 gallon aquaria placed on their ends, but they required some modification. I contacted an aquarium manufacturer and had him build standard aquariums except that I had him leave the glass out of one end; this end would now become the top of the new unit. This end was then replaced with an aluminum window screen built to size. Eventually it is our hope to establish large numbers of *Phelsuma* and we would therefore require the cages to be mounted in rows, or back-to-back in steel shelving.

These lizards tend to be very territorial and males will often kill other individuals. To conserve space we wanted to place these cages side-by-side, but we were afraid that even the sight of another male through clear glass would, or could, create problems with a male in an adjacent cage. This was solved by having the aquaria constructed of opaque glass. The top of the aquaria which now serve as the front was affixed with a narrow strip of glass on one side at the open end; this would act as a surface by which we could hinge a clear glass door. Another narrow strip of glass was sealed to the opposite end to act as a barrier to prevent soil or other substrate material from falling out when the cage was placed in the verticle. The hinge is a plastic device which the aquarium manufacturer provided. A door knob was affixed to the door and a magnetic catch attached to properly keep the door closed. This left a gap of about four inches between the bottom of the door and the substrate barrier. Since *Phelsuma* require good ventilation, a small aluminum window screen was constructed to fit this opening. This is also attached with magnetic catches so that it can be easily removed for cleaning. The entire cost for a 15 gallon unit was \$18.00 finished; a fairly reasonable price by today's standards. One two-light, four-foot florescent fixture will adequately light (and, in the case of *Phelsuma*, heat) four of these units placed in a row. These units could be modified for use with heat tapes by placing a piece of sheet metal, instead of glass, in the end opposite the top, or they could be heated by incandescent bulbs from the top.

For years I have been aware of some major differences between reptile and amphibian exhibits in British and European zoos, and those in North American institutions. North American zoos have not had anywhere near the success with amphibians and lizards in captivity that our British and European counterparts have over the past decade. One reason for this may be the almost exclusive use of living plants in British and European reptile and amphibian public displays. Although there have been some changes in North American collections, in recent years, artificial plants and unnatural exhibits are still the more common sights in our zoos. With this in mind, we have set up about twenty-five cages, in the past year, where we attempted to create a naturalistic environment for the inhabitants. We have successfully achieved this in small aquariums ( 10 and 15 gallon) and larger wooden units (3ft. X 4ft. x3ft. high). To date, we have only done this for lizards, amphibians and one turtle species. We hope to set up some similar units for smaller snakes in the near future.

On a cursory look at the possibility of including living plants in our terraria, the first thing which became obvious was that light levels would need to be increased dramatically. The effect of increased light is undoubtedly beneficial for the majority of reptiles and amphibians, and light is perhaps the single most poorly considered factor in the proper husbandry and propagation of herpetofauna in captivity. We based our experimental set-ups on the premise that if we provided enough light and the proper conditions to grow healthy plants within the terraria, then we were, at least, approaching the right environment for the animal housed therein. Because we believe Vita-lite florescent tubes to be the best available artificial light source for both the animals and the plants, these were utilized in all cages. Most of these enclosures were established for terrestrial forms; standard potting soil with gravel for drainage was used and they were planted with a variety of plants. Plants were usually chosen because of their known adaptability as terrarium plants, their hardiness and tolerance to adverse conditions, and when possible, because they were native to the geographical regions

## HERPETOLOGICAL HOUSING AND THE USE OF NATURALISTIC INTERIORS, Continued

where the animal inhabitants ranged. Several enclosures have been set-up which are for aquatic species, or amphibious forms. In these units we have incorporated filtration units for the water, aquatic plants and live fish. In some cases, the fish serve as an additional source of food for the reptile or amphibian occupant; in others, they simply add to the naturalism of the cage.

In the years that some of these cages have been in existence, we have had unparalleled success in maintaining certain difficult species and in breeding others. We have had a very high success rate in rearing young lizards, and though I can't prove it, I believe that much of this success is due to the increased light levels, the presence of Ultra-violet light, and the natural interiors. I am convinced that this type of set-up is far less stressful than conventional 'sterile' cages, and that it is extremely effective in eliminating the 'captive stagnancy' syndrome which I have described elsewhere. Besides being of great benefit to the animals housed in these enclosures, they are very enjoyable to look at. I honestly believe that the public would derive far more pleasure from viewing a naturalistic cage, housing a common gecko or salamander species, than they would from seeing a rare snake in a barren environment. The possibilities and designs for herpetological housing are unlimited. If you use your imagination, coupled with your knowledge of reptiles and amphibians, it is possible to create an environment which is both conducive to the health and well-being of your animals, as well as being both educational and pleasing to the zoo visitor, and easy for you, the keeper, to maintain. It is my hope that some of the suggestions and designs described in this paper will benefit you and your, hopefully, continuous pursuit of bettering the captive conditions of your charges.

If zoos are to survive we must continually upgrade the conditions under which our animals are housed, in an effort to properly maintain and reproduce them in captivity. In the old days, and I certainly hope that they are the old days, zoos assumed that they could afford to house their animals under deplorable (by today's standards) conditions, because when an animal died, it could be easily replaced from the wild. We can no longer operate on that premise! We must produce, in captivity, the zoo animals for the future; we cannot continue to take them from the wild. Captive propagation is a solution--and you, as animal keepers, are the key to that solution.

### Products Mentioned

Vita-lite is manufactured by Duro-Test Electric Ltd., Rexdale, Ontario.

"Ready Heat" Electric Heating Tapes, Cox Thermostat model #544, manufactured by Cox and Company, 215 Park Avenue S., New York, NY.

### Supplemental References

For further information on our caging see: "Caging and Feeding Techniques Employed at the Reptile Breeding Foundation", by T.A. Huff. A paper presented at the 2nd Annual Reptile Symposium on Captive Propagation and Husbandry, and published in their proceedings (1979).

For more on 'Captive Stagnancy' see: "Captive Propagation of the Sub-family Boinae with Emphasis on the Genus *Epicrates*", by T.A. Huff. In SSAR Contributions to Herpetology, #1: REPRODUCTIVE BIOLOGY AND DISEASES OF CAPTIVE REPTILES. Co-ed: James B. Murphy & J.T. Collins. 1980: 125-134.

## WOODLAND PARK ZOOLOGICAL GARDENS' GORILLA EXHIBIT

By  
B. Wayne Buchanan, Keeper  
Woodland Park Zoological Gardens  
Seattle, Washington



In the summer of 1976 work began to transform two of Woodland Park Zoological Gardens' bear exhibit areas into a spacious gorilla exhibit with a smaller interconnecting yard. When completed in the spring of 1978 the exhibit area enclosed 18,000 square feet of space. More than a year was allowed to lapse to allow plantings sufficient time to become established in the exhibit. In August 1979 the largest and most naturalistic gorilla exhibit in existence opened to the public.

Before expounding further on the exhibit area, I would prefer to discuss the service areas. The holding cages are the same areas previously used as the bear holding/denning areas. There have been many improvements made. Each cage has a skylight which is supplemented with florescent "Vita-light"<sup>TM</sup> tubes. This system provides very good lighting and a natural photoperiod.

The ceiling and approximately the first three feet of the walls are heavily insulated. The primary purpose is to deaden the noise and echo effect so common inside large, concrete structures.

In order to protect the insulation and skylights a lowered ceiling was installed just below the insulation. It is constructed of steel grating and has four-inch pipe running wall to wall at thirty inch intervals. The piping serves as climbing apparatus.

Triangular sleeping platforms are attached in corners at heights of three or five feet. The platforms are constructed of heavy metal framework and plastic coated chain linking. This seems to provide a comfortable sleeping surface. It should be noted that this design provides no exposed corner structures to cause possible accidental injury. The floor areas of all cages have an epoxy covering that greatly aids cleaning efforts.

All animal doors in the unit are the vertical guillotine type. They are operated via cable loop and a manual hand crank. With such a system, the door cannot be moved without the hand crank moving. This has resulted in one serious injury when one of the male gorillas jerked the door and the spinning crank struck the keeper in the face. We are currently in the process of motorizing the doors. The new system will be electric and will leave the present manual system virtually intact. This is very important should there be a power failure. Animals and keeper can maintain visual contact through all doors as they are clean lexan.

Another feature of the guillotine door is that we are able to open it to any height desired. In this way we can allow access to a certain area by selected smaller animals and at the same time deny access to that same area by larger animals. This is useful in introductions and certain breeding situations.

A final point concerning the door system is that there are at least two

WOODLAND PARK ZOOLOGICAL GARDENS' GORILLA EXHIBIT, Continued

doors in each cage. This makes it possible to move animals throughout any of the holding areas without the necessity of traveling through an area which might be occupied. As a keeper, I greatly appreciate this flexibility.

The cages are connected by a runway system that also leads to the exhibit areas. One of the runway areas has a movable wall which in essence makes the area a large squeeze cage. As part of the daily routine each animal passes through this area. This keeps them conditioned to entering the squeeze cage should its use be desired. It has been very useful in anesthetizing and crating animals.

The runway areas have six foot ceilings made of steel grating. This ceiling is also the floor of a catwalk from which the keeper operates the animal doors and directs the movement of the animals.

Above the operating mechanism for the door leading to the main exhibit area is a red light. This light is connected to a limit switch on the door used by keepers to enter the exhibit area. If the door is ajar the light comes on alerting the keeper that the exhibit is not secure and that animals should not be let outside.

The keeper area was created by constructing a ten-foot wide concrete block addition to the existing structure. It contains a compact kitchen area, lockers and storage shelves, and a desk area. Above the desk a TV monitor system is mounted. The keeper can monitor any cage and the exhibit area. The cages each contain a fixed mount camera while the exhibit areas are viewed by a single camera with pan and tilt capabilities.

As noted earlier the main exhibit area is quite large. Its general design is intended to simulate a clearing in the forest with plantings heavily concentrated around the periphery and much more sparsely in the centrum of the exhibit. The remains of two large fallen trees are present in addition to three live trees. Two of these trees are rather young while the third is a very large, mature maple. All three trees are guarded by a circle of "hot wire" around their bases. This is to prevent fatal chewing damage by the gorillas to the trunks of the trees. The large maple is made available to the gorillas for climbing by use of a log ramp that runs from the ground to the main crotch of the tree.

The back area of the exhibit contains a large, grassy knoll. The knoll creates an area of complete privacy (from the public) between it and the wall enclosing the back of the exhibit. The animals are not forced to be on display at all times. This has greatly reduced tension within the individual gorillas.

At the opposite end of the exhibit from the knoll is a shelter area. It has a roof, two walls of gunite rockwork, and a third wall of clear lexan for viewing by the public. The ceiling contains several electric heaters. The temperature of the shelter area can be raised three to five degrees Fahrenheit above the ambient air temperature. With the lack of sustained hard cold weather in Seattle, and this shelter, the gorillas can be put outside almost every day of the year.

The gorillas are restricted to the exhibit by a wall running about three-fourths of the exhibit's perimeter. The wall is supplemented in one area by a large pool which feeds a recirculating stream and waterfall.

## WOODLAND PARK ZOOLOGICAL GARDENS' GORILLA EXHIBIT, Continued

The remaining perimeter area is guarded by a dry moat. Gorillas are denied access to the moat by means of a hot wire. The moat is completely hidden from the view of the public as the landscape of the exhibit rises gradually as it approaches the moat. About three feet from the edge of the moat the landscape is two to three feet above the top of the moat. The ground then quickly drops to the moat's edge. The small resulting ridge is heavily planted as in the far side of the moat. From the public area these two planted areas simply blend together without a hint of the moat's presence.

Adjacent to the main exhibit area is a smaller exhibit area also heavily planted and with a small "private" area. It is joined directly to the main exhibit area by the same type of door described for the inside area. It is intended to be used for introducing or isolating an animal.

The naturalism of the exhibit is tremendously enhanced by the special features of the public areas. Perhaps the most important is the way the naturalistic plantings envelop the viewing areas and the public well before their reach the viewing areas. The exhibit is approached by winding paths very heavily planted on both sides. This eliminates any stark contrast between the public area and the exhibit and blends the two areas together very effectively.

This blending is enhanced even more by the feature of limited viewing areas. Rather than having view of the exhibit from all of or the majority of an exhibit perimeter, the public's viewing is limited to select points. This approach had two noteworthy advantages. (1) The public is never looking across the exhibit to other public viewing areas. (2) Through careful planning one can completely control what the public can see thereby masking any man-made features. When these two points are coupled with the naturalistic plantings in the exhibit area and in the public area, a sort of window effect is created. This gives the public a very close simulation of having come upon a group of gorillas in the wild.

The last point about the public area is associated with the gorillas' shelter area. As indicated earlier, this is a public viewing area. The roof of the shelter has been brought back over the public pathway. This results in an expensive shelter for the public from Seattle's frequent rains.

From a keeper's point of view, I sincerely feel this is the best exhibit I have ever worked. The inside holding area provides very well for both the needs of the gorillas and the needs of the keeper. The exhibit area is very spacious and provides all the elements one might desire to give the gorillas. Perhaps the greatest importance is the subliminal educational effect the exhibit has on the public. By this I mean the mental image of gorillas they carry is that of a natural social unit in a natural setting. It seems impossible for this not to have a positive effect on their appreciation of the species. This is the first step in conservation.



GIRAFFE SQUEEZE CAGE PROCEDURE FOR  
HOOFTRIMMING AT WOODLAND PARK ZOO

By

Wendy Wienker, Senior Keeper  
Woodland Park Zoo, Seattle, WA

A new African Savanna exhibit was opened at the Woodland Park Zoo in July of 1980. The giraffes were moved from their old enclosure to the new Giraffe House next to the main Savanna exhibit. One of the features of the new Giraffe House is a built-in giraffe squeeze cage to be used for hooftrimming and other medical procedures.

The new Giraffe House is a steel building, divided into a service area and a large room which has seven pens that have access to each other depending upon which gates are open. There is one additional pen which can be used for a sick giraffe, or for quarantine. This isolation room contains the squeeze cage and has access to an outside corral.

The giraffes are moved to and from the main Savanna exhibit via a series of gates, which includes crossing a main public pathway. As part of their normal routine as they go out each morning, the giraffes are routed through the room containing the squeeze cage. On days when the giraffes are kept in their barn due to excessive cold or wet weather, they are given access to the outside corral via the isolation room. The keepers try to maximize the time the giraffes spend in the isolation room so that they will become accustomed to the squeeze cage.

Equipment & Set-up

The squeeze cage is made of welded double-strength steel, and has four sides which are hinged together. One side of the cage is attached to the wall; the other three sides have wheels, enabling the cage to be used in three different configurations. When the cage is not in use, it is left open, with the three movable sides anchored in a straight line perpendicular to the fixed side. In this position, the squeeze cage takes up a minimum of space in the isolation room.

The second position is rectangular. This position is achieved when the giraffe has been encircled by the cage and the door has been latched. A heavy-duty hook anchored to the wall is attached to the cage at this time to give it greater stability.

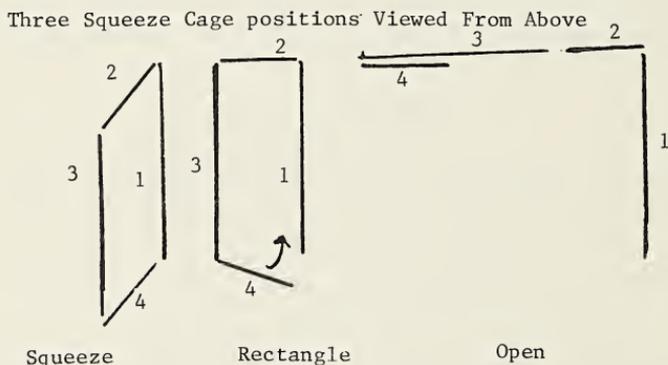
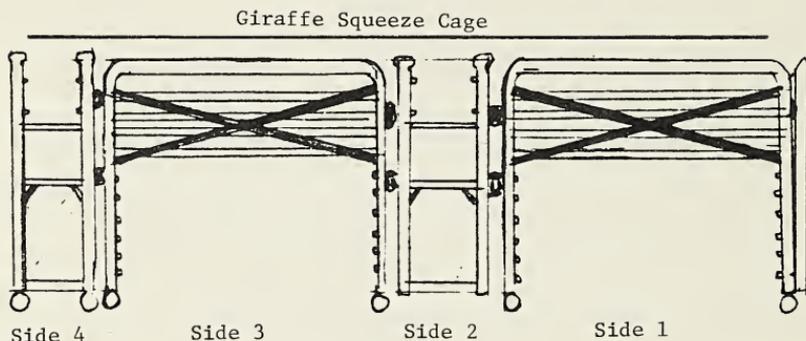
The third position is a trapezoid. The hook is removed and a come-along is used to squeeze the cage tighter and limit the movement of the giraffe. Additional equipment is used to prevent excessive movement from the giraffe, and to protect those working around it.

A heavy-duty cotton rope is secured over the shoulder of the giraffe to keep it from rearing up and going over backwards. A butt strap is used to keep the giraffe from moving forward and backward, and belly straps are used to keep it from going down in the cage. A specially designed hood and halter are used to help control the giraffe's head. Other ropes are used as needed.

Nylon straps, attached by quick-release, heavy-duty snaps are on the bottom of the squeeze cage to protect keepers from giraffe kicks. These can be removed when necessary to give access to the hoof needing to be

## GIRAFFE SQUEEZE CAGE PROCEDURE FOR HOOFTRIMMING, *Continued*

trimmed. The two smaller sides of the squeeze cage have plywood at the bottom to protect the keepers when closing the cage around the giraffe. A power grinder and standard hooftrimming equipment are used on the hooves.



### Procedure

The giraffe is fasted and denied water for two days. Shortly before the procedure, it is mildly sedated with Rompum (Xylazine). The giraffe is then walked into the room with the squeeze cage and is closed into the room. Several keepers maneuver the cage round the giraffe, waiting until the giraffe is facing the preferred end of the cage before closing and latching the cage. A stiff knee-brace is attached to the cage to prevent the giraffe from pushing the cage open as the keepers are attempting to close it. This is an important safety feature.

Once the cage is locked in the rectangular position, the shoulder band and butt strap are placed on the giraffe and temporarily secured. The cage is then winched into a trapezoid, until the sides of the cage are flush with the giraffe's shoulders and hips. The slack in the shoulder and butt ropes is taken in and the belly bands are put in place. The halter and hood are then placed on the head of the giraffe by keepers positioned on the platform above the cage.

## GIRAFFE SQUEEZE CAGE PROCEDURE FOR HOOFTTRIMMING, *Continued*

The leg to be worked on is lifted by placing a rope around the fetlock and pulling upwards until the giraffe lifts his leg. If this does not work, a hot shot can be used to induce the giraffe to lift its leg. A hoof bench was designed to support the foreleg of the giraffe during the trimming procedure and to give the ferrier more leverage. Excess growth is trimmed or nipped off the hoof. A power grinder can be used on the harder parts.

When the procedure is over, the straps at the bottom of the cage and the belly bands are removed. The cage is released back into a rectangular position and the butt straps and shoulder straps are removed. The hood and halter are removed and the giraffe is left standing in the cage for several minutes as a training procedure before being released.

### Results

We have had several successes and several failures in our use of the squeeze cage. Success often depends on the temperament of the giraffe undergoing the procedure. Some giraffes can deal with the stress of being confined better than others. We have tried the procedure on three giraffes, who have reacted to the cage with moderate to severe hysteria.

Our failure resulted in a giraffe going over backwards, and was caused by not getting the shoulder strap over the giraffe soon enough to prevent it from climbing up the front of the cage. Fortunately, the squeeze cage can be opened rapidly and the giraffe was able to get up on its own. We have tried to prevent this from happening again by putting the shoulder strap on as soon as the cage is closed.

A second failure occurred when a giraffe had an unusual reaction to the drug Rompum and became too sedated to stand up in the squeeze cage. As the giraffe began to slump, the belly bands slipped forward leaving most of the weight of the giraffe supported by the butt strap under the tail. Stimulants and physical inducements were used to get the giraffe back up. The reaction to the drug is a more difficult problem to solve, as the same dosage had been used in several successful sessions. Also, giraffes will react differently to the same drug.

In addition to the several successful hooftrimming sessions, we have recently used the squeeze cage for another procedure. An older female giraffe had a stillborn calf and three weeks later developed a uterine infection. She appeared sluggish, feverish, and had a bloody vaginal discharge. We were reluctant to totally immobilize her due to her age and condition, and decided to try the squeeze cage without sedating her. The procedure went very well, and we were able to take blood samples, give her antibiotics, and place boluses in her uterus.

The procedure was repeated two more times--with equal success, and the giraffe appears to have recovered completely. However, we should note that even though this female is the most sensible of our giraffes, the veterinarian was at considerable risk when placing the boluses in the giraffe. Nevertheless, it is still very satisfying to successfully treat an animal in a manner that decreases the risk of injury or death.

### Problems and Suggestions

We are constantly reviewing our procedure, and plan to make more modifications to the cage to make it safer for the giraffe and the keepers.

## GIRAFFE SQUEEZE CAGE PROCEDURE FOR HOOFTRIMMING, *Continued*

First and foremost, we need to deal with the problem of sedation. The female giraffe with the infection was treated without any sedation, and it is hoped that we can try this with our more excitable giraffes after they have become more conditioned to the cage.

Improvements are indicated in the strap system around the bottom of the cage. It is very dangerous when a giraffe leg is caught between the straps. A stronger, more adjustable belly band is needed, and some kind of improved floor surface is needed to give the giraffe better footing. More modifications will be added as more applications of the squeeze cage occur. The potential of the squeeze cage is just beginning to be realized.



## TRUST RECEIVES GRANT FOR EDUCATION

*Submitted by Karen Starr Wakeland*

The Wildlife Preservation Trust International has received a grant of \$100,000 for support of renovations to the International Training Center for the Captive Propagation of Endangered Species. This grant, awarded by the H.N. Pew, Jr. Charitable Trust, will support improvements to student quarters, as well as the construction of a behavioral research center.

The International Training Center is sited on the Island of Jersey, in the Channel Islands, British Isles. It adjoins the Jersey Wildlife Preservation Trust, a world-renowned zoological facility dedicated to the preservation of endangered species. The International Training Center was founded with the purpose of training individuals in captive breeding and conservation techniques. Since its inception it has hosted students from over 22 countries around the world.

Commenting on the award, WPTI's Executive Director Jon Jensen noted, "This significant grant starts the final phase of our capital improvements to the Training Center. Our ability to accommodate more students will permit us to train more people every year, and the new behavioral research unit will enable us to conduct critical research that is long overdue."

The Wildlife Preservation Trust is an international non-profit organization dedicated to the support of captive breeding of endangered species. In this capacity they support breeding programs, field surveys, rescue missions, reintroduction programs, research and education in the area of endangered species and wildlife conservation.

CAPTIVE REPRODUCTION OF THE SHELTOPUSIK  
(*Ophisaurus apodus*)

By  
Oliver Claffey, Keeper  
and  
Bob Johnson, Curator-in-Training  
Metro Toronto Zoo, Toronto, Ontario, Canada

The Sheltopusik or European Glass Lizard (*Ophisaurus apodus*), as the binomial implies, is a legless member of the Anguidae that ranges from the Balkan Peninsula including the Yugoslavia/Albania coast through Turkey, Syria, Iran, Iraq, and into the Soviet Union.

The family Anguidae tends towards a reduction of limbs although shoulder and pelvic girdles remain. They are pleurodent lizards with osteoderms underlying the scales which in most species necessitates a deep, longitudinal fold that functions as an expansion groove.

The genus *Ophisaurus* is unique in having both 4 mm leg stumps or vestigial limbs on each side of the cloaca and palatal teeth. The Sheltopusik attains a length of up to 100 cm and our animals ranged in weight from 372 gms for the smallest female up to 410 gms for the largest male.

Males are larger animals and sexing is based on head size and conformation. The males, like many skinks, have larger more robust heads, slightly thicker necks, and heavier brow ridges. The smaller females have a correspondingly lighter build. Our 3.3 animals could be easily sexed on the basis of head size.

These lizards are ideal display animals. They readily accept the captive environment and quickly familiarize themselves with the exhibit terrain. If given enough room to establish familiar escape paths and secure resting spots, they tend to exploit surrounding exposed areas. Their educational value lies in their similarity in body form to the serpents. Thus they exemplify both similarities and differences among snakes and lizards and illustrate the extremes of limb reduction in the squamata.

Our animals were collected at Nikolic, Nori Doiran, Macedonia near the Yugoslavia/Greece border. Lying at 40° of latitude this area had a mean low in January of 48°F and a mean high in July of 75°F. The shortest days had 10 hours 9 minutes of light, the longest 15 hours 54 minutes of light.

Exhibit photoperiod was adjusted to simulate seasonal cycles with day/night ratios established at 9.15 in the winter and 15.9 in the summer with intervening periods at 11.13 and 14.10. Exhibit temperatures fluctuated daily but never exceeded a high of 90°F or a low of 68°F with the mean high being 87°F and the mean low 71°F. Relative humidity varied from 55% to 80% with a mean of 68%. At 2 metres long X 1 metre wide with the exhibit divided into two levels, one being 30 cm higher than the other, their exhibit was large enough to allow visual separation and to elicit natural thermoregulatory behavior.

Although originally constructed on two levels we cannot underestimate the importance of providing visually isolated retreats for subordinate males and harassed or gravid females. We also provided access to a variety of substrates that included fine gravel, river stones, large flat rocks, wood

CAPTIVE REPRODUCTION OF THE SHELTOPUSIK, Continued

chips, and sphagnum moss. Thermoregulatory behavior included movement from the dry, warm gravel and stone of the upper area to the cool, damp wood chips and lying with only the head visible. Contrary to published reports (Gadow, 1923) Sheltopusik do climb readily. Branches in the exhibit were used regularly to climb the 30 cm between levels. Our animals were particularly active after spraying the exhibit with water and the exhibit would be thoroughly explored with one or two animals climbing branches.

The need to cool many temperate species before the onset of reproductive activity has been well established. We have had limited successes with other exhibit species by regulating photoperiod with only slight reductions in winter temperatures. For example, locally collected Eastern Garter snakes bred consecutively 6 years, Blanding's Turtles have bred the last four years, and we anticipate that our second generation of captive-bred Massasauga Rattlesnakes will reproduce in 1982--this year being their first sexually mature year. A relatively large number of animals in a correspondingly larger exhibit provides the opportunity of having one or more receptive females and breeding males. Thus photoperiod may be seen as a conditioning factor and temperature as a coordinating or trigger mechanism. Temperature, however, may be important in fecundity itself and the long term fecundity of an individual.

Our Sheltopusik fed readily with slight reductions in consumption occurring previous to and during reproductive activity. The animals were fed twice weekly (Monday & Thursday) on a diet consisting of equal parts of hard-boiled eggs and MTZ Plain Carnivore Diet\*, supplemented with Roger/STB SA-37 Pet Supplement Powder.\* In addition to this diet, each animal was hand-fed one cricket, dusted with the supplement powder, twice a week. Additional crickets were then provided on a free choice basis.

Food consumption per animal for each feeding was estimated to be approximately 10.7 gms, including the weight of the crickets. The approximate calculated nutrient composition of the above diet was as follows:

Crude protein	%	17.58
Crude fat	%	9.35
Crude fibre	%	0.29
Calcium	%	0.43
Phosphorus	%	0.43
Gross energy	Kcal/g	1.822

Crickets in themselves have an imbalanced Ca/P ratio and are also deficient in Ca. Thus the need to dust crickets with a supplement that includes a source of Ca and known essential macro nutrients. The Sa-37 powder provides a source of Vitamin D<sub>3</sub> which is utilized in the absorption of Ca from the gut.

Copulation and the subsequent deposition of eggs occurred in 1979 and 1980. In May 1979 eggs were laid over several days. In February 1980 two animals were engaged in reproductive activity with the male holding the female with a coital neck bite for eight hours. Within the first hour penetration and withdrawal was observed at least fifteen times while the female remained subdued in the grip of the male. Seventy days later, on 20 April, 3 eggs were deposited in dampened sphagnum moss. Over the next eighteen days a total of 11 eggs were laid. With the rapid deterioration of the eggs and with no signs of development it would appear as though these eggs were infertile.

## CAPTIVE REPRODUCTION OF THE SHELTOPUSIK, Continued

In 1981 copulation was observed on 18 January and again on 7 February--the same date as the 1980 copulation. Both copulations were preceded and followed by aggressive encounters between males that included chasing, head butting, and head biting. The more aggressive male observed breeding in January forced another male away from the usual resting area and was unsuccessful at breeding attempts over the next few days.

On 24 March one female laid 7 eggs and on 8 May another female laid 11 eggs, 65 days and 90 days respectively after copulation. The eggs were oval, white, with the largest being 45 mm x 24 mm.

To summarize: copulations were observed once in January, and twice in February; eggs were laid twice in May and once in April and March, 65,70, and 90 days after copulations; and clutch sizes included 7,8, and 11 eggs. Fitch reported eggs being laid on 20 July and Grzimek quotes early August as the hatching time.

Along with *Ophisaurua attenuatus*, *O. ventralis*, and *O. hartii*, our *Ophisaurus apodus* also showed brooding behavior. The female coils around her clutch and does not abandon them when disturbed. In fact when moved to examine the first clutch, the female hissed loudly and actively defended the eggs by head butting the intruder before returning to coil around the eggs.

The eggs were collected and placed in pairs, half buried in damp peat moss in sealed plastic bags which were then placed in a Rolex egg incubator. The temperature was set at 86°F and the relative humidity at 84%. In both clutches fertile eggs began sweating and became moldy within three days of incubation. In both cases only two eggs remained viable through to hatching and these were the largest eggs of each clutch.

Earlier experience with vermiculite resulted in the dehydration of eggs. As reported in the literature we too found that unless moisture is added to the medium or the vermiculite turned over on a regular basis the medium adjacent to the egg loses its free water potential to the egg. As a result eggs that rely on substrate moisture are cut off from this moisture source and dehydration may occur.

On 11 May after 48 days of incubation a slit in one egg of the first clutch was observed. Further inspection revealed a fully developed, but dead, Sheltopusik. Two days later a slit appeared in the remaining egg of that clutch and the young Sheltopusik with yolk sac still attached could be seen inside the half opened egg. The grey and black striped young Sheltopusik was out of the egg the next day, weighed 10.2 gms and measured 230 mm.

Unfortunately the day after hatching the apparently normally developed neonate prolapsed its yolk sac through a hernia in the abdomen. The protruding yolk sac was tied off and removed. The next day the hatchling Sheltopusik was active and within days was eating small crickets and observed drinking. Thirteen days after hatching the Sheltopusik died as a result of septicemia caused by an infection of the intra-abdominal remanant of the yolk sac.

In the past we have had a number of hatchling animals with yolk sacs unabsorbed or full term animals dead in the egg. Demeter, 1981, working with Chinese Water Dragon, (*Physignathus cocincinus*), eggs found that higher temperatures of about 30°C with the shorter incubation periods resulted in more successful hatchings than eggs incubated at lower tem-

peratures. We have since increased our incubation temperatures and hope to alleviate this problem.

\* SA-37 manufactured by Roger/STB, London, Ontario

\* MTZ Carnivore Diet: 93% lean ground horsemeat  
7% MTZ Carnivore Supplement Powder

Deatils in Oyarzun, Sergio: "Feeding of Carnivores at MTZ"  
(in preparation)

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## Publications Available

The Inventory of Live Reptiles and Amphibians in Captivity, current January 1, 1982 by Frank L. Slavens is now available. This is a privately compiled and published inventory (with breeding statistics) of reptiles and amphibians in 176 (69 public and 107 private) collections from the United States, Canada and Mexico. The information covers 382 genera, with 952 species, and 1,352 forms. The section on reproduction contains information on 314 species reported as bred during 1981. Published by the author, this volume is available from the publisher ONLY. Prices are: Hardbound, \$25.00 (includes handling) and Softbound \$20.00 (includes handling). A few copies of the 1981 edition are also available. The prices are the same as for the 1982 edition. The 1982 edition contains 212 pages. Order from: Frank L. Slavens, P.O. Box 30744, Seattle, WA 98103.



## BIRDS IN MIXED SPECIES EXHIBITS

By  
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*Audubon Park & Zoological Garden*  
*New Orleans, LA*

The expansion and renovation of most zoos today emphasize "natural" exhibits, designed to suggest the habitat from which the animal originates. The elimination of visible barriers is a major factor in creating the illusion of being in the wild. Carrying the "natural" concept a step further leads to an exhibit in which several species endemic to the same habitat are displayed together. Hoofstock often have been maintained together in the past. And mixed flocks of birds have been the rule rather than the exception. But in recent years, the concepts of natural habitat, minimal barrier and mixed species have been combined to create realistic exhibits in which both birds and mammals are successfully displayed. This paper discusses the results of birds in mixed exhibits at Audubon Park.

### 1. Selection of Birds

The selection of bird species must first take into consideration the physical characteristics of the exhibit. A large, open air, "plains" type exhibit would require large birds adaptable to being rendered flightless, such as cranes or storks. Passerines would not do. A marshy, thickly planted exhibit would be unsuitable for an ostrich but could be an effective place to display herons. The possibilities are further limited by the mammal factor. In most cases of a mammal-bird exhibit, the mammal will be the dominant species as a result of size, temperament, speed or agility. The birds selected for an exhibit must be able to cope with the character of the mammals present. For instance, our bison enjoy running around their exhibit. The pheasants, geese and cranes are sufficiently fleet-footed to stay out from under the hooves. But when we attempted to add pinioned vultures, they were summarily trampled. Part of the problem is that any new fixture or animals in an exhibit is a novelty and must be "tested" by all the resident animals. Any bird introduced into our elk exhibit must be vigorously chased by the elk before it becomes just another fixture in the yard and is left alone. In such cases, introduction of the bird via a so-called "howdy" cage is probably a good idea.

Even when birds are successfully introduced into an exhibit, they still need to be provided with a "safe" place into which they can escape and not be followed. In many cases a brush pile or some other solid structure to hide behind or under is sufficient. Our ground hornbills have access to a large oak tree. The secretary bird and marabou storks can slip between posts to avoid the white rhinos. And swimming birds can always find refuge in the water. The individual personalities of the animals is also significant.

EXHIBIT	MAMMAL SPECIES PRESENT	BIRD SPECIES	INJURY DONE TO MAMMAL	BREEDING
Africa I 1.1 acres	white rhino Grevy's zebra	marabou stork secretary bird eastern white pelican	none none none	none no mate juveniles
Africa II 1.1 acres	ellipsis waterbuck sitatunga	red-necked ostrich leadbeaters' ground hornbill	male ostrich gored by waterbuck none none	fertile eggs none
Africa III 1.2 acres	gemsbok Thompson's gazelle ankole	white-bellied cormorant East African crowned crane Abdim stork	none none none	some nest building nest building fertile eggs incubation none
Africa IV 1.1 acres	sable white-bearded gnu	lappet-faced vulture Egyptian geese blue-necked ostrich	stepped on by hoofstock none none	no mate none infertile eggs
North America I 1.5 acres	bison white-tailed deer	sandhill crane Canada geese white-fronted geese	leg broken by bison legs broken by bison none	none nest building, fertile eggs, incubation, hatching none
North America II	tule elk	ring-necked pheasant sandhill crane ring-necked pheasant wild turkey	none male killed by elk none	nest building, fertile eggs, incubation, hatching none nest building, infertile eggs, incubation nest building, fertile eggs, incubation, hatching total

South America I 1.2 acres	barnacle geese	none	none	none
	tapir	none	no mate	
	guanaco	none	nest building, fertile eggs, incubation/hatching	
	capybara	none	none	
	ocellated turkey	none	none	
	northern screamer	attacked by capybara	none	
	cape shelduck	none	fertile eggs in box, incubation	
	black-necked swan	none	nest building, fertile eggs, incubation/hatching, young raised	
	assorted waterfowl	none	none	
South America II .9 acre	American flamingo	none	nest building, fertile eggs, incubation/hatching, young raised	
	assorted waterfowl	none	none	
Asian Domain I .8 acre	ruddy shelduck	none	fertile eggs in box, incubation/hatching	
	sarus crane	none	none	
	barheaded geese	none	none	
	blue-eared pheasant	none	none	
Asian Domain II	demoiselle crane	none	none	
	radjah shelduck	none	none	
	Eyton's tree duck	none	none	
	Indian spotbill	none	none	
	Swinhoe's pheasant	none	nest building, fertile eggs, incubation/hatching	
Primate	seriema	none	none	
	talapoin			
	muntjac			



EXHIBIT	MAMMAL SPECIES PRESENT	BIRD SPECIES	INJURY DUE TO MAMMAL	BREEDING
Africa I 1.1 acres	white rhino	marabou stork	none	none
	Grevy's zebra	secretary bird eastern white pelican	none none	no mate juveniles
Africa II 1.1 acres	ellipsis waterbuck	red-necked ostrich	male ostrich gored by waterbuck	fertile eggs
	sitatunga	leadbeaters' ground hornbill white-bellied cormorant	none	none some nest building
Africa III 1.2 acres	gemsbok	East African crowned crane	none	nest building fertile eggs
	Thompson's gazelle ankole	Abdim stork	none	incubation none
Africa IV 1.1 acres	sable	lappet-faced vulture	stepped on by hoofstock	no mate
	white-bearded gnu	Egyptian geese blue-necked ostrich	none none	none infertile eggs
North America I 1.5 acres	bison	sandhill crane	leg broken by bison	none
	white-tailed deer	Canada geese white-fronted geese	legs broken by bison none	nest building, fertile eggs, incubation, hatching none
North America II	tule elk	ring-necked pheasant sandhill crane	none male killed by elk	nest building, fertile eggs, incubation, hatching none
		ring-necked pheasant	none	nest building, infertile eggs, incubation
		wild turkey	none	nest building, fertile eggs, incubation, hatching
South America I 1.2 acres	tapir guanaco capybara	barnacle geese	none	none
		jabiru stork	none	no mate
		rhea	none	nest building, fertile eggs, incubation/hatching
		ocellated turkey	none	none
		northern screamer	attacked by capybara	none
		cape shelduck	none	fertile eggs in box, incubation
South America II .9 acre	cavy	black-necked swan	none	nest building, fertile eggs, incubation/hatching, young raised
		assorted waterfowl	none	none
		American flamingo	none	nest building, fertile eggs, incubation/hatching, young raised
		assorted waterfowl		
Asian Domain I .8 acre	axis deer blackbuck	ruddy shelduck	none	fertile eggs in box, incubation/hatching
		sarus crane	none	none
		barheaded geese blue-eared pheasant	none none	none none
Asian Domain II	swamp deer nilgai	demoiselle crane	none	none
		radjah shelduck	none	none
		Eyton's tree duck	none	none
		Indian spotbill	none	none
Primate	talapoin muntjac	Swinhoe's pheasant	none	nest building, fertile eggs, incubation/hatching
		seriema	none	none

## 2. Feeding

Once the task of choosing and introducing birds into a mixed exhibit is accomplished, feeding each species becomes a major problem. Depending on the species involved, birds may eat mammal food, mammals may eat bird food, so it becomes a matter of devising a system by which each species has access to the diet designed for it to the exclusion of the other animals in the exhibit. Again, since the mammals are generally the dominant species, provisions must be made to exclude them from the bird food.

In many cases, this can be accomplished by selectively corralling and feeding some species at night, thereby creating two or more separate areas within an exhibit. Where this is not feasible, feeders must be devised. Our most difficult exhibit is South America--tapir, guanaco, capybara, rhea, jabiru and waterfowl. To feed rheas but not tapirs, capabaras, or guanacos, a slotted feeder was devised. To feed jabirus but not tapirs or rheas, a slotted feeder over the water proved to be effective. For waterfowl, a slotted feeder keeps out capabaras and a large overhanging top prevents rheas, tapirs and guanacos from reaching the slots.

In hoofstock-ostrich exhibits, the ostrich feeder is hung high on the fence. But this does not prevent the sitatunga from "walking up" the fence to reach the food. A slotted feeder on a post will be a possible solution.

A variation on the slotted feeder is a hole in the chainlink fence with the food pans outside of the exhibit. The cranes and geese adapt well to this and you avoid the problem of having a structure in the exhibit which could potentially cause injury to the other animals. Even so, a hole which will safely accommodate a crane's head is also large enough for a small gazelle to reach through. Trade off.

## 3. Reproduction

Once the birds are established in an exhibit and have learned to co-exist with the mammals, the next goal is reproduction. Success in this area may be heavily dependent upon the amount of area available per animal (as would be true in any conventional exhibit). The "safe" places play a role in reproduction by providing a place of security, a prime factor in any nesting. Our Canada geese and ring-necked pheasants nest at the perimeter of their exhibit, staying out of the way of the bison. The wild turkeys nest under brush piles which, after an initial period of investigation, the elk do not disturb. In several exhibits, ducks successfully nest in boxes. No "safe" place was created for the crowned cranes to evade the ankole, gemsbok and Thompson's gazelles, so they found their own. They built a nest and laid eggs on a drain cover four feet out on the lagoon which forms the front of the exhibit. The black-necked swans were sufficiently aggressive to prevent disturbance of their nest by tapirs, guanacos, rheas and jabiru. However, aggressive defense of a nest by a male sandhill crane resulted in his being trampled by an elk which was not intimidated. Although cavies are not aggressive, they do disrupt flamingo nesting merely by their presence and activity.

Raising chicks in our mixed exhibits is generally not attempted. This is not due to the mammal factor but because of predation by natural wildlife. To date, only flamingos and black-necked swans have successfully raised young on exhibit. However, eleven other species have produced fertile eggs, some of which hatched on exhibit and the chicks were taken for hand-rearing, others of which hatched in the incubator.

4. Capture

Capturing the birds in a mixed species exhibit can pose problems, depending on the nature of the mammal species. As with feeding, the ideal situation would be one in which some of the animals could be corraled while the capture takes place. If this is not possible, care must be taken to separate the target birds from the rest of the animals. This reduces the possibility of alarming the other animals and the problems that could cause.

In conclusion, it is possible to manage birds in a mixed species exhibit. With some forethought and planning, most problems can be avoided before they occur. Even so, a lot of trial and error is still required to determine which species or which individuals are compatible. Reproduction of birds in a mixed species exhibit is the ultimate indicator of an exhibit which "walks". One must use imagination and persistence. But it can be done.



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KEEPER SAFETY ACCORDING TO  
THE GOSPEL OF BUCHANAN

*By*  
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It would be difficult to find a vocation that offers as great a variety of ways to inflict mayhem on oneself as does zoo keeping. Therefore, as zoo keepers, we have ample reason to consider the subject of safety. Yet, I am constantly amazed at the regularity with which I see keepers unnecessarily risk life and limb. I am even more amazed at how often they get away with it. Perhaps this is why so many pay so little attention to this aspect of zoo keeping.

There are, in my mind, two basic reasons for being concerned with safety. The first is quite obvious, but I will mention it anyway: to preserve one's own life and health. The second is also rather obvious, yet is often overlooked: to preserve the life and health of the animals in your care. The stress inflicted on an animal during an aggressive encounter with a keeper, and any physical injuries it might incur during the event, are completely contrary to the objective of one's job as a zoo keeper. I encourage you to give serious consideration to this second point now. It is doubtful you could do so objectively if you delay until a time when all your energies are directed at preventing an enraged and/or fearful animal from nibbling on your eyebrows.

In the remainder of this paper I propose to offer a systematic safety approach to the job of zoo keeping. For ease and continuity, I will address the situation of a keeper entering an occupied animal enclosure. However, it is applicable to all animal situations as well as many non-animal situations. It is a system that is tried and tested. It works! It has saved lives!

The first concept I'd like to address is best demonstrated by a short story. Not long ago, while preparing a solution for cage cleaning, I splashed a drop of concentrated disinfectant in my eye. I required some medical attention, but no serious injury resulted. A few days later all keepers received a memorandum requiring us to wear eye protection while mixing disinfectants. Although this was not a bad idea, it did not address the actual cause of my accident. I did not get a caustic chemical in my eye because I was not wearing eye protection. The chemical splashed in my eye because I made a foolish, careless mistake. Of all accidents you may have on the job, I feel 99% of them will be your own fault. No safety system will be effective unless you accept the primary responsibility for your own safety.

Next, know how to read your animals. One should know not only the specific behaviors and their meaning for the species in question, but also the individual personalities, likes, dislikes, habits, etc. of each animal. Knowledge of these facts will enable one to properly interpret and predict the actions of the animals involved.

Examine each situation carefully and make the following considerations before entering an enclosure:

- 1.) Think of everything that could possibly go wrong.
- 2.) Design a plan that will eliminate all the potential problems recognized above.
- 3.) Have a back-up plan prepared should the primary plan fail.

If the above are done properly, it is doubtful that the following considerations will be needed. However, I strongly recommend they also be made, and, as earlier, before entering the enclosure:

- 4.) Have escape route(s) planned.
- 5.) Should all else fail, have a combat plan. In many cases this is grasping at straws. Remember, your life may be in the balance.

These steps need to be constantly tempered with your judgement--judgement based on your abilities to read your animal (s) and know precisely what is happening. Learn to trust your abilities in this area. Do not be too hesitant to alter or cancel your plans if that is what seems best.

I am not advocating paranoia. I am advocating awareness--constant awareness. The described safety approach coupled with awareness will enable one to maintain control of the situation, which will mean the safe accomplishment of the desired goals.

Earlier I mentioned the necessity of accepting responsibility for one's own safety. There is yet another pitfall that can nullify any safety precautions. No doubt the most common comment I have heard after an animal injures a person is, "He never did that before." Another too-often heard statement when discussing possible dangers is, "He would never do that." This second statement in particular causes me concern. The most one could ever objectively say is, "He has never done that." Both of these statements are indicative of the attitude that there are no dangers. Though the dangers may be very well controlled, they are not eliminated. To refuse to acknowledge the existence of danger is, in my opinion, courting disaster and either neutralizing or greatly reducing the effectiveness of any safety program.

The vast variation in situations and facilities from zoo to zoo makes the listing of specific safety recommendations very difficult. However, I feel the following have at least some universal application.

- 1.) Shift animals to a holding cage or similar area rather than go in the enclosure with them. If such facilities do not exist, create them. This is not to say one should never go in with animals. On the contrary, a keeper can often accomplish many positive goals when a rapport is established with certain animals that permits direct interaction. However, one should never have to go into an occupied enclosure to perform basic daily routines. As we all know, animals have many changes of mood. There will be times when one simply should not go in with an animal. Shifting animals eliminates risk and stress to both animal and keeper.
- 2.) Feeding should be a very separate, distinct routine. At no time should it include any social and/or play interactions with the keeper. Failure to do so may lead to false expectations by an animal. When food is expected and not presented, aggression may result. The aggression can be directed toward the keeper or transferred to a subordinate cagemate. Food also elicits a defensive behavior in many animals. This may accentuate any aggression that occurs for other reasons. Granted, food is a very effective tool for establishing association with a new animal. Yet, I feel it is a poor foundation on which to base an entire relationship.
- 3.) When entering an enclosure with animals always carry a broom or similar item that can be used defensively if necessary. It has been my experience that when displayed toward an aggressively approaching animal, such objects are usually successful at inhibiting the continued advance of the animal.
- 4.) Though closely related to the preceding recommendation, this point deserves individual attention. Always have an elephant hook on your person when in the proximity of these animals. The mere presence of a hook will inhibit the initiation of many problems and provide the necessary tool for regaining control of the animal should a problem occur. There are some zoos that require a mandatory suspension of any keeper found not practicing this precaution. I encourage all zoos to consider this approach.

I would like to restate the fact that if the prescribed preparations are done properly, many will never be utilized. But it is of the utmost importance that they be ready if needed--there will be no time to consider solutions when immersed in a dangerous situation.

In no way do I mean to imply that the safety approach presented in this paper is the last word in safety. Yet, I do feel it presents a very solid foundation on which to build.



EXHIBIT DESIGN IN CLIMATE EXTREMES  
(AT THE WASHINGTON PARK ZOO)

By  
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*Washington Park Zoo, Portland, OR*

In Portland, Oregon, climatic extremes (from below 20°F to above 100°F last year, with a lot of rain thrown in) necessitates that weather be one of the primary considerations in exhibit design. While we are fortunate in that extremely cold weather lasts only two to eight weeks, penguins, felines, primates, hoofed stock and elephants all have different climate tolerances which must be taken into account. The following is a discussion of how Washington Park Zoo has tried to solve some climatic problems through exhibit design.

The nursery viewing area provides visitors protection from the elements while they view the care of small animals. The nursery contains Isolette infant incubators to start a newborn animal in an environment with precise temperature controls and also humidity control. Then animal may then graduate to a 36" x 64" fiberglass cage which can be maintained at room temperature (70°F) or supplemented with heat lamps or heating pads. The third stage is an indoor stall approximately 7' x 10' attached to an outdoor run approximately 14' x 15'. Temperature in the indoor stall can be at outdoor levels or increased by forced air room heater or heat lamps. The outdoor run is completely enclosed by wire mesh and is suitable for almost any young climbing animal too large to fit through 1" x 1" mesh. These runs can be equipped with water tanks for swimming and logs for climbing.

The Children's Zoo is protected from the weather by a large roof. A wood fence surrounds it and helps to keep winter winds from blowing full force in the area.

The new frog and tadpole exhibit faces west and gets the hot summer afternoon sun. A wood screen placed in front of the window, but back far enough so people can walk in front of it, helps prevent the water from overheating. The screen is removed in the fall. A small water heater keeps the frog water between 68-72°F all year.

The rabbits and guinea pigs have small barns and the ducks have nest boxes to protect them from the cold. Inside the guinea pig barn are placed the two halves of a carrying cage to cut down further the air space to be heated by body heat. Breeding male animals are kept in the kitchen area which is kept about 60-65°F. When the temperature goes below 25°F, the barn animals are brought into the kitchen at night.

Ferrets can contract foot problems if they stay too long on a wet surface, and also require warmth during the cold weather. They have a glass-fronted enclosure off the kitchen that is heated in the winter. The top of a dutch door can be opened for ventilation in the summer.

The pygmy goats have an inside area that can be heated when needed. During the day, they are enclosed in a fenced-in area in the contact area which is half covered by the large roof. They appear to enjoy sunning themselves in the open part on warm days.

## EXHIBIT DESIGN IN CLIMATE EXTREMES AT WASHINGTON PARK ZOO, *Continued*

Opossums are prone to cracking ears and feet when the weather turns nippy. Worse yet, they may lose parts of their extremities to frostbite. Up to this year, our opossums have been brought into the kitchen at night when the temperature drops below 45°F, but this fall we are in the process of building a heated, glass-fronted enclosure with air vents that can be opened when needed. It will also have running water, nest boxes, logs and plants. Nothing but the best for the stars of the Children's Zoo.

Most of the bird collection is housed indoors with cover from the rain. The parrot exhibits have heat lamps, the birds of prey no heat, while the cranes have a heated room available to them, but can go outside all year round. We feel that the heated Penguinarium has contributed to Humbolt chick survival, and has enabled the birds to have a continuous breeding cycle as they would in the wild.

We have three large ponds that are used as nesting sites for wild waterfowl. A small pond is located near the Children's Zoo so that children may view the waterfowl close at hand. Low shrubs give the birds some protection from the elements.

The Cascades Stream and Pond exhibit was opened on 9 July 1982. There is a waterfall and stream leading into the building where aquaria containing Cascades amphibians, fish, reptiles, insects and crustaceans are located. This exhibit is a natural for our area because the patrons are inside and out of the weather (dry in winter, cool in summer), while viewing beavers and otters in natural settings outdoors. These animals have ponds, dirt and plants in which to frolic. While the otter off-exhibit nest box is heated, neither the public viewing nest boxes, nor the beaver off-exhibit nest boxes are heated.

The feline building has outside exhibits for the larger cats and an inside nocturnal exhibit for small cats and other nocturnal animals. The outside exhibits are 80-90% open to the weather. Our keepers have found that the cats which are kept outside have better coats, shinier and thicker, than if kept inside. Side baffles provide a lot of wind shelter. Leopards, lions, and clouded leopards are brought in at night if the temperature drops below 40°F. On extremely windy nights, the Siberian tigers are brought in as well.

Several of our exhibits have been renovated to give a more naturalistic appearance. The clouded leopard exhibit's extensive rockwork was done by the feline keepers. In many of the outside exhibits, gardeners and feline crew have been expanding and enhancing the existing planters with climbing trees, and live shrubs and plants. It not only makes the exhibits more aesthetically pleasing, but provides shade, hiding niches, and a softer footing for the animals. The Siberian tigers have a pool in which to splash any day they choose. During cool weather, the tigers, lions, and leopards enjoy lying on heated concrete pads. These stark looking pads have been disguised in some cases to fit the rockwork, or in the case of the leopard exhibit, their favorite rock. As the animals get older, they tend to use the heated pads more often. The snow leopard and red pandas do not have heated pads as they have extra fur between their foot pads, and generally are better adapted to the cold.

The nocturnal exhibit is located inside the building as are the holding pens for the outdoor exhibit. A heating and ventilation system is used to keep the building temperature between 60-65°F. The nocturnal exhibits

## EXHIBIT DESIGN IN CLIMATE EXTREMES AT WASHINGTON PARK ZOO, *Continued*

also have hot water floor heating systems if so needed. Most mothers with offspring are provided with a nest box equipped with video camera, microphones, and heating pad.

The bear grottos are not heated since bears do not require heat during the winter. The thick concrete walls helps to keep the temperature inside the grottos warmer in the winter and cooler in the summer than the ambient temperature. Maternity dens are located adjacent to the holding cages, and are equipped with video and audio hookups. We realize the beneficial aspects of heated floor pads in maternity dens for occasional low temperatures. Since our winters are generally mild, the extra heat is usually not required, but the last couple of dens have had the heated pads installed as an added precaution.

All bears exhibited at Washington Park Zoo have a pool so that they can swim throughout the year. If it is icy, extremely cold or wet, or a combination of these, the bears have access to their inside holding cages. The moats and platform overhangs provide shade on summer days, and as in the feline building, the side baffles provide wind breaks.

The paddock area barns provide our hoofstock and hay feeders protection from the wind and rain. The eland, giraffe and musk ox are also provided with outside feeders during the summer. In several exhibits, the high side walls also provide protection from blowing winds, and overhanging tree branches provide shade. The hippos, giraffes and wallaroos are not as tolerant to the cold as the rest of the hoofed stock so their barns are heating during cold weather.

The elephant facilities have two outside yards, and the elephants are rotated to each of the yards daily. If it is icy, they are kept inside. The oldest yard is an asphalt substrate and has a pool. Access to the new yard is through the world's first hydraulic elephant "crush". There is a bypass in case an animal is in the crush. This yard is seven-tenths of an acre and covered by sand which is kinder to their feet than asphalt. It was designed so that a front-loader can drive into the yard to replace the 8"-18" deep sand. If they so desire, four to five elephants can cool off in the 80,000 gallon pool. The yard also has a covered area where they can get out of the hot sun.

The inside of the elephant house consists of six off-view rooms and a large viewing room where babies are kept with their mothers and "aunts" until old enough to venture outdoors. Generally, this is at ninety days old and a minimum of 50°F. These rooms are heated by forced air natural gas and kept between 55-65°F.

We have just finished a major renovation of our primate building. The building is kept between 65-75°F. The marmosets and various tree dwelling monkeys stay inside the building. The primate exhibits have skylights which lighten up the two-story exhibits, but also protect them from our rainy weather. The gibbons, siamangs, and mandrills have access to new outside exhibits with grass and trees in addition to their inside enclosure. They may elect to go outside if the temperature drops between 50-55°F and there is no wind. If it is windy at these low temperatures, the outside access is closed off.

The chimpanzees have a new, dry-moated island. Besides grass and climbing structures, there is running water and caves. The caves have a heated surface of between 65-70°F. If it is freezing and icy, the chimps

are not allowed outside, but they can play in the snow.

When the new orangutan exhibit was designed, the greatest concern was climate control as there can be problems with bacteria and protozoans. It was written into the builder's contract that if the weather was between 9-30°F, the exhibit would stay at 70°F, so the enclosure is heated or ventilated to remain between 65-70°F. This two-story exhibit is located on the south side of of the primate building so it receives sun all year. Instead of a concrete floor and steel bars to swing on, they now have grass, which they love to tear up, and wood climbing structures. There is a concrete substrate beneath the wood structures for cleaning purposes.

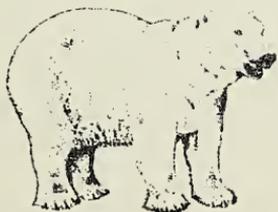
The new lemur exhibit is under construction. It is open to the elements, but like chimp island, will have heated caves. There will also be available heated, indoor cages.

In 1979, our new quarantine building was constructed. It has three large heated inside rooms that each opens into a round, high-walled enclosure that is open to the elements. This new building, along with the hospital facilities, allows us to quarantine or medically treat all sizes of animals.

In case of a power outage, the zoo has a power generator that can be switched on. Any unnecessary power, such a lights, that is not absolutely needed is shut off so that the generated power is used for hydarulic doors and animals which require heat.

In the last couple of years the Northwest has had a unique element to consider--ash. Mt. St. Helens likes to bless us occasionally with a dusting of fine ash particles that will scratch glass if wiped off of it, or form a dust cloud if swept. This means everything has to be hosed, and a very small amount of ash, when wet, has the weight of concrete. Animals in the nursery, Children's Zoo, felines, primates and bear grottos are brought indoors when ash begins to fall. It can make breathing difficult and is also hard to get out of fur. As keepers pray for winds to blow the ash eastward, the polar bear was observed in a playful position no doubt asking for the gray, gritty ash to be turned into soft white flakes!

The keepers at the Washington Park Zoo are fortunate in that we are contributing participants in the never-ending process of exhibit design, and how it will best serve the needs of the animals in our care.



THE FIRST SUCCESSFUL BIRTH OF A LOWLAND GORILLA  
AT THE PHILADELPHIA ZOO

By  
Patti Kuntzmann, Junior Keeper  
Philadelphia Zoo, Philadelphia, PA



I would like to start with a background history of our gorilla project as related to me by Dr. Robert Snyder, Director of the Penrose Research Lab, Philadelphia, PA.

The animal management staff held a routine meeting in early January 1969 to discuss the lack of success in breeding gorillas at our zoo. Though we had kept gorillas for years and had successfully bred both the Bornean and Sumatran orangutans, and the chimpanzees, we had failed to breed our female gorillas. During the discussion, it was decided that there was much to learn about management of great apes. There was the so-called second generation problem, i.e. female apes born in captivity seldom accepted and suckled their offspring.

It was decided at this meeting to initiate a research project in the New Rare Mammal House which was opened 2 May 1965. The Director of the Penrose Research Laboratory would be in charge. This was to be a long-term study involving two generations of gorillas. The objective was to find out whether social organization and early experience were factors that led to successful breeding and care of offspring. The offspring of the higher primates, as we all know now, grow slowly and require a great amount of parental attention. Evidently, the relatively large brain and the complexities of the primate social structure require a long period of training and experience. This type of learning is in direct contrast to animals that have innate behavior patterns appropriate for protection and rearing of the young.

The great apes are usually brought into captivity as very young animals. Our project was based on the belief that these young apes were deprived of two important aspects of primate learning, parental and juvenile socialization. Early socialization involved maternal care and attention and sometimes even paternal attention, while the juvenile period involves social interaction with other young animals and sometimes older animals as well. It is during these critical periods that the anthropoid apes learn behavior patterns that are required for a successful life in a group. Learned behavior patterns include proper copulation and nursing techniques, recognition and tolerance of ones own species. This tolerance is the common sense to recognize ones position in an established social hierarchy.

The first of the young gorillas, two males and a female arrived on 11 July 1969 and were placed in quarantine. A young Penn student was asked to play nursemaid to the babies who collectively weighed only 58 pounds. The largest male, Toby, with a weight of 20lbs. became the immediate favorite, probably because of his handsome features and exuberant personality. Bobby, the smaller male, was less forward and seemed to be myopic and sometimes even cross-eyed. Snickers, was tiny, shy and a clinger at first, but later she became the adventurous one of the group.

The original plan was to have two males and four females, but baby gorillas were never plentiful on the market. Furthermore, the zoo had stipulated that only orphaned gorillas from the wild or ones born in captivity would be accepted. Since Zaire, their African habitat, had passed strict laws

THE FIRST SUCCESSFUL BIRTH OF A LOWLAND GORILLA AT THE PHILADELPHIA ZOO  
(Continued)

against trapping gorillas for resale to zoos, the only gorillas available were ones confiscated from illegal trappers or obvious orphaned gorillas picked up by conservation officers. These gorillas were collected by Hans Van Der Brink and kept in Holland for rehabilitation.

Our next opportunity came on 17 April 1970, when John and Samantha became available. We were forced to take Johnny whose weight was 32lbs. and approximately two years old because the two were inseparable. We acquired Haloko on 31 July 1970. She was found in a native village along the Congo River. When she arrived back in Holland, she weighed less than 15lbs. Because there were no playmates for her in Holland, she was sent to Philadelphia. She was in extremely poor health and required intensive nursing care from Ann Hess, who supervised the gorilla project and handled all the abandoned animal babies who needed constant attention. Ann is now a veterinary assistant in the Animal Health Department.

Eventually on 24 September 1970, the babies were placed on exhibit in the Rare Mammal House where they became instant star attractions for the zoo. Visitors, as usual, love to see interactions between humans and gorillas. These interactions were with animal technicians trained to feed and care for the gorillas and take notes on their behavior.

The final objective was to integrate the two groups into a colony of six animals that would eventually, at maturation, deliver healthy gorilla babies and provide for their nurture and training without the help of man.

The two groups were placed together on 9 November 1970 without any serious problems. A group leader (human) remained with the group during the daylight hours seven days a week. This went on for three years. The project was unfortunately terminated at this time due to change in management, but the group stayed together.

Late in 1974, the zoo decided to sell one of the males. Naturally, Bobby (the one with "squinty" eyes) was selected as the least desirable and he was sold to the Detroit Zoo. Quite unexpectedly, on 15 June 1975, Snickers delivered a dead male baby. The keepers that were there at the time said that they think she would have been a good mother because, though the baby was dead, she carried it correctly and did not abandon it. Since all three males were potential fathers, the real father was unknown.

On 17 March 1976, Toby, who was now a magnificent 286 pound specimen at only about 8 or 9 years old, developed a period of malaise and loss of appetite. He was immobilized by the vet department for diagnostic tests and treatment and died without recovering from the drugs. Necropsy results showed that he was suffering from an acute viral infection involving the heart and brain. His keepers sorely missed Toby. To this day they still talk about the magnificent gorilla named Toby. Suddenly, the Zoo had only one male gorilla. A microscopic examination of Toby's testes revealed that he could not have been the father of the baby born in 1975. John was our only hope. Several months went by without anymore babies. It became evident that the father of the Philadelphia Zoo's first baby gorilla had been sold to another zoo.

In April of 1978, a male gorilla of between 10 and 12 years old arrived at the Philadelphia Zoo on breeding loan. Ramar had had a background of show business and only human contact. He had come from the North

THE FIRST SUCCESSFUL BIRTH OF A LOWLAND GORILLA AT THE PHILADELPHIA ZOO  
(Continued)

Carolina Zoo, who were and still are building a new exhibit for him. In the meantime, it was hoped that Ramar could interact with our females and hopefully breed with them. John was publicized as being disinterested in his females and that Ramar was going to give us hope again. This was about six months after I entered the Rare Mammal House, and I was greatly insulted at the attitude that John was not interested, for I knew he was. We introduced Haloko and Samantha to Ramar, much to John's dismay. Ramar, who had never even seen a gorilla before, was terrified. We soon learned that he took a disliking to Haloko and seemed to be drawn to Samantha who treated him very carefully. We soon separated Haloko and a few months later sent her to the Bronx Zoo on breeding loan. Samantha and Ramar became quite close although Ramar made no real sexual advances toward her. Sam on the other hand tried just about everything to teach Ramar the facts of life and at one point almost succeeded. However after about a year of togetherness, Ramar and Sam still hadn't copulated. It was decided that perhaps Ramar needed the presence of another male, so Samantha was returned to John and Snickers with the intentions of later introducing Ramar to the group. As it went, priorities in the zoo changed with the opening of Bear Country, and the introduction was delayed. Despite my repeated badgering that the delay would be permanent if it wasn't done soon, Ramar remained alone. He was later sent to Miami.

Meanwhile in New York, Haloko was immediately liked by all of her keepers and apparently by their male gorilla as well. For in 1979 she gave birth to a little male named Kelly. She abandoned her baby and the baby was pulled. A year later in September 1980, she gave birth to a female named KiKi who was also pulled. Since the nursery at the Bronx Zoo was overflowing with little gorillas, KiKi was sent to Philadelphia to be raised by Ann Hess. Ann raised her for eight months and KiKi now lives in Boston with two other babies. There she will be able to interact with others of her own kind.

Meanwhile back in the Rare Mammal House, Charles Fagan, Senior Keeper at the time and I were watching what was going on with our own little group. Within one year, right before our very eyes, John had changed into a beautiful male silverback adult gorilla. While Samantha was with Ramar, John grew closer to Snickers and when Sam was returned to them she was treated as somewhat of an outcast for awhile. However things soon returned to normal and the last observed breeding between John and Sam took place on 2-15-80. On 2-29-80, Charlie and I noticed a change in Sam's behavior. She appeared very lethargic and spent most of the day lying on her side holding her stomach. She had also vomited in the morning and had very loose stools. She ate, but not with much enthusiasm. She remained in this condition for about two days and then returned to normal. Ann Hess would come over to check on her periodically and follow her progress. During this time, Snickers would spend a lot of time grooming and comforting her. It wasn't until after the birth that we thought that this might have been a form of morning sickness.

Charlie and I became more and more convinced as time went on that Sam was definitely pregnant. By July we were certain. Her change in attitude and physical appearance were definite. On 8-22-80 I decided to take a urine sample to the lab for testing. It was positive. We figured she would deliver sometime in October. The zoo staff was thrilled and all crossed their fingers.

THE FIRST SUCCESSFUL BIRTH OF A LOWLAND GORILLA AT THE PHILADELPHIA ZOO  
(Continued)

The second part of my story begins on 1 October 1980. I was ten minutes late this particular morning and as I closed my locker, one of the women who usually came in to water the plants, Nikki Garwood, yelled from the public area, "Patti, do you know that the gorillas have a baby in the cage?" I quickly ran to the front of the cages and observed Sam cleaning her baby. John and Snickers sat close by and followed Sam everywhere. I called Charlie who had already started working his run. He said that not ten minutes before everything was normal, so Sam must have delivered in the span of ten minutes.

My first thought was to call Dr. Snyder since he was the one who had known them from the beginning. He wasn't in. Things were going well so we called our curator, Dietrich Schaaf and our supervisors. Everyone was, of course, thrilled. I had a hard time holding back the tears because the sight of the baby being accepted, not only by Sam but the others as well, was wonderful to behold. Since we hadn't seen the baby nursing, we had an 18-hour watch in shifts. Finally on the third evening, someone saw the baby nurse. This was a relief to everyone. Since the other gorillas would constantly follow Sam around all day to get a close look at the baby, we decided to separate them at night so Sam could get some rest.

Everything went smoothly until the evening of 7 November 1980. It was near time to close up. Before I left the building I wanted to take a look at the little gorilla group. I climbed the ladder to the tunnel and found the three of them and the baby sitting in the tunnel. Sam was lying with her back toward me. Suddenly I heard the baby scream. The baby had been between Sam and John. Snickers was sitting in the back of the tunnel. John sat casually up against the wall. I could not see what happened exactly, only that Sam got up and they all leaned over to investigate. Either Sam herself, or John did something to the baby. The baby still appeared alert and fine and when I went to the front of the cage to investigate, I could see that the baby was not using one arm. It seemed to be dangling. I knew this had to be reported to the curator right away. I called Dietrich and he immediately came over to investigate, but was unable to see anything definite. He said he would check again first thing in the morning. The following morning it was discovered by getting a better look, that the baby had been bitten on the hand and that one of the fingers was bitten off. The arm was not being used so we were concerned that it was broken.

Dietrich called the vet right away at home and she came in. We decided that we should separate Sam and knock her down so that the baby could be examined and treated. After about a half an hour the separation was complete. Sam was in the tunnel with little Jessie. Our Director, Dr. Amand, told me to put the other gorillas outside so as not to upset them. After about half an hour of trying to immobilize Sam, who was screaming pitiously, they finally got the needle in far enough for it to take effect. The drug used was Ketamine. As she grew weaker and realized she was losing her grip on the baby, Sam became extremely upset. I held her soiled hand for as long as it was necessary. The look in her eyes when she stared at me is something that will remain in my memory forever.

Upon closer examination by the vet it was found the baby had two deep cuts on the palm of the hand and the middle finger was bitten off. The ring finger was also broken. But her arm was not broken--much to everyone's relief.

THE FIRST SUCCESSFUL BIRTH OF A LOWLAND GORILLA AT THE PHILADELPHIA ZOO  
(Continued)

Jessie was taken to the Penrose Research lab and surgery was done on the hand. Jessie was given under 5cc of local anesthesia. The top half of the middle finger was bitten off. The bottom half was amputated and sutured. The cuts on the palm of the hand were sutured at the ends, the middle portion debrided, flushed and left open. She was then given .6cc of bicillin and also tetanus antitoxin. We gave her 6cc of Tylenol which she promptly spit up.

During Jessie's physical, everyone commented on what good shape she was in and recorded her weight at 6 lbs. at 39 days of age. The broken ring finger was left to heal on its own. Jessie was then returned to her mother. I was told to put her in the back of the tunnel, blankets and all, and then to open the door for Sam to come in. Since Sam never liked being locked in the tunnel, she held the door open and sat in the doorway and looked at the baby. When the baby whimpered, she quickly pulled on the blankets and picked the baby up in her arms and went into the cage. She groomed and kissed the baby and everyone knew how happy she was to be Jessie back.

Jessie was to be pulled again ten days later to remove the sutures. Though we were afraid that Sam would play with or chew on the sutures, she showed us she was much smarter than that by not even letting us see the hand and not touching the sutures at all. When it was time for the sutures to be removed, Sam did it herself.

In the months that followed, though I was no longer a steady keeper in the building, I was to witness many wonderful events in Jessie and Samantha's life. I took notes at every opportunity and Sam and I became closer than ever.

I watched Jessie go through her little colds and her cut lip when she was caught one day between Sam and Snickers during a little hassle. John hadn't had any contact with the baby or Sam since the accident with the hand, and I know he misses that. We thought we would let Jessie grow a little so that if John went on a rampage, she would be limber and fast enough to get out of his way. Snickers is now shifted back and forth on alternate days to spend time with both John and Sam and Jessie.

From a playful little gorilla herself, to a wonderful mother, Sam has shown the Philadelphia Zoo and her keepers that she can do anything and do it right.

We will never know for sure whether the first three years of training were responsible for her unusual success for there were no proper controls. But, in the past, young mother gorillas in captivity have been very poor mothers. Samantha showed us, at the Philadelphia Zoo, that she was a veteran and we are extremely proud of her.

If you're wondering where the baby's name came from, it came from a docent. Before we knew what sex she was, one of the docents suggested naming her Jessie which was a unisex name. When she was sexed and we found out that she was a female, I looked up the name "Jessie" in a baby book and found out that it meant "my present" in gaelic. Surely Jessie was Sam's present from life. And of course it was Sam's present to the zoo. Last of all, but certainly not least, this event was one of the most wonderful experiences of my career.

THE FIRST SUCCESSFUL BIRTH OF A LOWLAND GORILLA AT THE PHILADELPHIA ZOO  
(Continued)

I bet you think that our story is over. Ah, but it is not -- for right now, back in the Rare Mammal House, our chubby little Snickers is pregnant again. I hope her pregnancy is successful for she does have a few physical problems. Snickers needs a baby and I know she would be just as good a mother as Sam.

I, as a keeper, will never forget witnessing this great event in the Philadelphia Zoo's history. After 106 years, I had the privilege of being there when the first successful birth and mother-rearing of a Lowland Gorilla finally occurred at our zoo.

Sam showed me something I think I already knew -- that the Great Gorilla is an intelligent, affectionate creature that is certainly capable of something that looks to me like love.

The future intentions are to put John back with both Snickers and Sam and the baby within the next year. I will look forward to the day that John can finally share in the wonder of his daughter.

Acknowledgments:

Dr. Robert Snyder for excerpts from his paper, "Management of Gorillas in Captivity: The Philadelphia Zoo Gorilla Project".

Dr. Dietrich Schaaf for access to his notes that were taken by volunteers and for his support.

Volunteer Docents for the taking of important notes on the development of Jessie during her first year.

All of the Keepers who gave me past knowledge of the gorillas.

Albert Lowendowski who gave me access to Sam and Jessie's medical notes.

Thanks to everyone involved in caring for Jessie when she needed it.



## Keeper's Alert

WANTED: Humorous true stories, jokes, poems and limericks about the zookeeping profession for inclusion in a planned mass media humor book. Send any such material to: Rick Passaro, Rt. 3, Box 773, Front Royal, VA 22630. AKF will keep you abreast on the book's progress and hopefully where you will be able to buy it in the future.

THE ELEPHANT MANAGEMENT PROGRAM  
AT WOODLAND PARK ZOO

By  
Ellen Leach, Elephant Keeper  
Woodland Park Zoo, Seattle, WA



Elephants are an expanding part of the Woodland Park Zoo (W.P.Z.). Not only are the elephants expanding both in size and numbers, but their care program is expanding also. In addition to the usual care that elephants receive in zoos, there are some extra features in the W.P.Z. program that I feel are beneficial both for the elephants and for W.P.Z. visitors.

The two main areas of concern in recommended elephant management procedures include safety and health care.

For safety's sake, no handler is to enter an enclosure with an elephant unless there is a back-up person in the area. Similarly, at least two handlers should be present when walking the elephants outside of their enclosure. Handlers are to have an elephant hook with them even if superficially that may seem inconvenient or unnecessary.

Also for safety's sake, the elephants are taught certain behaviors. For example, they learn line-up positions. When necessary, we can then position all 15,000 plus pounds of elephants in a certain place and know where they'll be until released. The elephant's acceptance of restraint by chains is another tool for safe handling. This tool is used often during veterinary procedures.

Keepers' health care program for the elephants includes daily bathing and body inspections, and regular foot care.

Besides these generally recommended elephant management procedures, the W.P.Z. program has some special features. To compensate for an exhibit that is unfortunately inadequate for such large and intelligent animals, as most elephant enclosures are, there are some considerations for the W.P.Z. elephants that we feel are beneficial to their physical and psychological health.

The elephants are given a variety of diversionary objects--barrels, pipes, tires, browse and logs. The favorites of these are, not too surprisingly, the browse and logs. I'd like to point out that a log that is multi-directionally mobile and had an interesting shape is far superior to a straight, fixed log.

The elephants' enclosure is psychologically expanded by taking the elephant on walks on the zoo grounds. This also gives the elephants the chance to engage in behaviors such as grazing, browsing, and of course, getting in some good rubs on trees.

Another consideration given the elephants is freedom from chains at night. Although the elephants are trained to accept chaining, it is practiced for short periods during the day under the supervision of the keepers rather than the 16-hour chainings that are commonly practiced. At W.P.Z., we feel this freedom to move about is very important for the elephant's physical and psychological health. Video tapes have shown us that the elephants move about quite a bit at night and have social interactions not seen during the day.

THE ELEPHANT MANAGEMENT PROGRAM AT WOODLAND PARK ZOO, Continued

Good management of staff at W.P.Z. encourages and allows good animal care. One aspect of this is the presence of well-qualified keepers on the grounds 24-hours-a-day rather than just 8 hours.

In the case of the elephants, hay feedings by night keepers has not only facilitated more natural feeding patterns for the elephants but, in fact, has put an end to coprophagy by the young elephants. When it was noticed that the young elephants had manure on their mouths in the morning, we had the flexibility to add a feeding at the time the elephants started the day (which is around 5 a.m.), rather than waiting until the day keepers started their day.

Keeper work shifts are flexible, and this flexibility can be used to give the animals more time outdoors when that is beneficial. There were days this summer when elephant keepers were at work to let the elephants outside at 6 a.m. and to put them away at 9 or 10 p.m.

I believe that the support of employee education is a sign of good management. In addition to keeper education on the zoo grounds, there is support for attendance to conferences. I think all of us share the hope that keeper education will reflect in better animal management.

Research and conservation are important parts of W.P.Z.'s elephant management program. Behavior research is conducted with the aid of video equipment, docents, and students of animal behavior at W.S.U. One recent study of the W.P.Z. elephants' activity at night showed us that the African elephant, Watoto, is unable to lie down in a normal fashion--a very important piece of information. Incidentally, had this elephant been chained, she probably would not have been able to lie down at all.

Health and reproductive research is conducted through the Animal Health Department. The elephant diets have recently been analyzed by our consulting nutritionist, Dan Higgenbottom. We have already seen some changes in the elephants as a result of Dan's recommendations and will be watching for other, specific changes after the new diet is totally implemented.

For reproductive research, a blood sample is drawn every two weeks from our oldest Asian elephant, Bamboo. These samples are frozen. In the future, when there is a sizeable batch of samples and the zoo has the funds to do so, the samples will undergo hormone testing. We will learn Bamboo's estrus cycle from these tests and, hopefully, she will become a candidate for artificial insemination.

In conjunction with research, there is record-keeping. Weights and measurements are periodically recorded. Every six months photos are taken of each elephant--rear, front, and side views. This is a useful record for any long-lived zoo species. Subtle changes may occur over the years which may otherwise go unnoticed. We also photograph any long term problem areas at this time. Currently, we're taking close-ups of skin.

Public education is one of the main goals of the W.P.Z. One of the zoo's education programs is the summertime Open Air Theatre. Several days a week, there are 20-minute programs, each of them giving in-depth information about a certain animal or group of animals at the zoo.

One of the programs we have had presents the elephants to the public in an arena outside of the regular elephant enclosure. This is not a show,

THE ELEPHANT MANAGEMENT PROGRAM AT WOODLAND PARK ZOO, *Continued*

but an opportunity for the public to interact with the elephants in a controlled situation. While the elephants are in the arena, an educational talk is given over our P.A. system. This is an enormously popular program with the zoo visitors, and we feel they gain an appreciation for elephants that no other vehicle could give them.

The other Open Air Theatre program with the elephants is "Elephant Baths." Again, this is not a show in the usual sense but is an extension of a necessary, daily routine. We are not competing with circuses, but are offering to the public a unique program that can be experienced only in a zoo. As an educational talk is given over a P.A. system, visitors watch the elephants go through the disciplined routines of their bath and body inspection. Following this, the elephants go and splash, roll and trumpet in and around their pool. I believe that seeing these two extremes of behavior helps visitors appreciate the psychological richness of elephants. In summary, I feel that the elephant management program at W.P.Z., with its special features, contributes to the health of the elephants and offers the W.P.Z. visitors some unique learning experiences.



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*We should think of our resources not as  
having been left to us by our parents,  
but as having been loaned to us by our  
children.*

---Kenyan Proverb



BREEDING THE BLACK AND WHITE CASQUED HORNBILL  
AT THE METRO TORONTO ZOO

By  
Duncan Bourne, Foreman  
Douglas Chessell, Senior Keeper  
Metro Toronto Zoo, Toronto, Ontario, Canada

The Black and White casqued hornbill [or Gray-cheeked hornbill] (*Bycanistes subcylindricus subquadratus*) ranges from the regions of the Cameroon and Angola through to Central Africa. The male is a large black and white bird with a dark bill and truncated casque. The female is smaller and has a casque confined to the base of the bill. For a more detailed description see Mackworth-Praed and Grant (1970).

In late 1974 the Metro Toronto Zoo received 3.3. Gray-cheeked hornbills from Uganda via a dealer. On arrival the birds were quarantined, wormed with piperazine and telmin, and given tetracycline as a prophylactic treatment. After the quarantine the birds were moved to new holdings and paired.

The first breeding pair was in a holding barn for the 1976 and 1977 seasons. The female died of a traumatic injury at the end of the 1977 season and the male died a month later of enteritis and septicemia. This pair nested and laid fertile eggs which failed to hatch (see Table II for details). The other two breeding pairs, housed in the African Pavilion, had access to elm trunks with rotten centers from 1976 through the 1979 breeding season. These trunks did not stand up to the excavating by the hornbills and were eventually replaced with artificial nestboxes. In 1980 both African Pavilion breeding pairs nested successfully. One young was reared by the pair in the north aviary (NA) and two young were reared by the pair in the south aviary (SA).

DIET

The basic diet offered to the hornbills at the Metro Toronto Zoo consisted of 300 g. carnivore mixture, 100 g. hard-boiled egg, 45 g. carrot, 250 g. banana, 130 g. apple, 130 g. tomato and 100 g. grapes. Additives to this basic diet included 2 tablespoons SA-37 Supplement Powder, 1 teaspoon dicalcium phosphate, and 1 tablespoon Carnivore Supplement Powder. The grated carrots and eggs, along with the vitamin and mineral supplements, were added to the carnivore mixture. This mixture was then rolled into small balls of approximately one inch in diameter. The fruits were cut into one-inch, bite-size pieces. The carnivore ball mixture and the fruit pieces were kept separate on the feeding tray and offered to the birds once a day at approximately 10:00 a.m.

The average daily consumption of the basic diet for the SA pair was 560g, with the consumption of the carnivore mixture representing 30%, or 150g of the total intake.

ENCLOSURES

The enclosures for each of the three breeding pairs differed substantially. The holding barn pair was in a concrete-floored, wooden-walled and wire mesh-fronted enclosure measuring 4.3m long x 2.4m wide x 2.1m high. A window (1.2m x 0.6m) at one end allowed some natural light into the enclosure, but required supplementation with incandescent light. The area was not open to visitors and staff was restricted. The temperature for

## BREEDING THE BLACK AND WHITE CASQUED HORNBILL, *Continued*

the area was maintained at approximately 21°C, and the relative humidity at about 60%.

The two pairs in the African Pavilion were in vocal contact with each other but not within sight. The pavilion temperature was maintained around 23°C and the minimum relative humidity was approximately 60%.

The NA pair were in a well-lit, pyramid-shaped aviary of 2.5cm nylon mesh (15.2m x 7.6m x 15.2m high), which followed the contours of the building. The aviary was shared with a group of Vulturine guinea fowl (*Acryllium vulturinum*) as well as a pair of Red-crested touracos (*Tauraco erythrolopus*). The nestbox, 7.6m above the dirt floor, was the highest perching point in the aviary.

The SA pair were in a smaller, pyramid-shaped aviary of 2.5cm nylon mesh, 7.3m x 6.1m x 9.1m high. This aviary was much darker due to climbing plants covering the mesh. A covered public walkway, cutting through one side, with glass viewing panels, allowed the public to look into the aviary. The nestbox was one of the highest perching points in the aviary, 3.6m above the ground. There was also a small, shallow pool in each aviary.

### NESTBOXES AND MATERIALS

In the wild, Gray-cheeked hornbills nest in cavities fairly high in a tree, or, in certain instances, in rock crevices (Granvik, 1923). The entrance hole is normally reduced to a narrow crack using a clay/soil mixture.

The pair in the holding barn utilized a nestbox measuring 46cm x 46cm x 61cm high. It is located 1.5m from the ground and had a 20cm x 18cm entrance hole. This opening was located 28cm from the base of the box, and a small perch was just below it. No material was added to the box by the keepers, and apart from visual checks and removal of two unhatched eggs, the nestbox was left untouched between seasons. This pair was offered a clay/straw mixture in one bowl and moist clay in another.

The NA pair used a nestbox measuring 46cm x 46 cm x 91cm high. This nestbox had an 18cm x 23cm entrance centrally situated 64 cm from the base. A perch below the opening allowed easy access to the nest. The nestbox was packed with shavings to the level of the base of the hole.

The nestbox for the SA pair was 58cm x 61cm x 91cm high, and had a 15cm x 15cm entrance hole 61cm from the base with an access perch similar to the other nestbox. This box was also packed with shavings. Both pairs had a constant supply of wet clay in a bowl at ground level and both boxes were partially sealed with clay by the keepers. This clay was subsequently chipped off by the birds when they became interested in the nestboxes.

### COURTING

Feeding of the female by the male was the initial courting activity. In the year-round heated buildings that the three pairs were in, this activity started in January or February. In an outside aviary at Birdworld, Farnham, England it started in mid-April (Porritt and Riley, 1976). The Metro Toronto Zoo males gave their females all of the grapes, the favorite of all the hornbills. The barn male also gave his female pieces of hard-boiled egg yolks.

## BREEDING THE BLACK AND WHITE CASQUED HORNBILL, Continued

The barn male established his pairing by attacking another male housed with them a month before his female walled-up in 1976. During this period, occasional mutual preening was seen, including the male grabbing at the female's neck and preening around her tail feathers and vent area. This activity was seen from early February to early April in the NA and SA pairs and was followed by mating in mid-April. In the NA pair an attempted mating was seen six weeks before a successful one was observed. The final matings for the NA and SA pairs were observed 29 and 17 days, respectively, before the female was sealed in the box. In 1977 the barn pair mated 55 days before the female was walled in. Unfortunately, no eggs were found in the nest at the end of that confinement.

Courtship, feeding and preening occurred prior to the presence of a nest-box in the NA pair as well as the pair at Birdworld (Harvey, 1973).

### SEALING-UP AND CONFINEMENT

The first interest in the nestbox was normally shown by the male in January or February. The NA male showed first interest in the box the day after copulation. Male interest in both cases involved chipping away of old clay and removing some shavings from the interior of the nestbox.

Within a few days the females were seen on the nestbox or perch in front, investigating the hole and contents. On occasion the male appeared to be coaxing the female to the box with food. He would fly to the tree perch next to her and offer her food, then fly to the nestbox perch with it. If she did not follow, he would repeat the process.

The SA female entered the box during February or March, six to seven weeks before seal-up, but the NA female did not enter the box until two and one-half weeks before seal-up. The males were never seen to enter the nestbox.

The use of wet clay started in the days following the female's first entrance. The female was never seen carrying the clay, which agrees with Moreau's (1937) statements about the genus *Bycanistes*. However, he also said that females do the work of sealing, but our experience agrees with Harvey (1976) in that the males were found to perform most of this work. Occasionally, when the female was inside the box and the male outside, they were seen with bills crossed, smoothing clay on one side of the hole, then the other side. Examination of the box at the conclusion of the breeding season showed a 10cm thickness of clay around the hole inside the box, and a 7cm thickness on the outside.

From her first interest to final seal-up, the female spent more and more time in the box, often hitting at the interior walls. The male made frequent visits to her with clay balls and food. Wet river clay was used almost exclusively during the sealing-up process, although Chapin (1926) mentions that dung is often used by the genus *Bycanistes*. In 1977 the barn pair used their feces before switching to the clay provided. Later the barn male was seen working with ground meat, but this was after the female was sealed in.

The use of clay continued occasionally even when the work appeared complete, with one male adding clay 70 days after seal-up. The finished slots varied in shape from a crescent 10cm high x 1.9cm wide, to a T-shape 15cm high x 2.5cm wide.

BREEDING THE BLACK AND WHITE CASQUED HORNBILL, *Continued*

\* = wing length

TABLE II

	Africa Pavilion North Aviary 1980	Africa Pavilion South Aviary 1980	Africa Pavilion North Aviary 1981	Africa Pavilion South Aviary 1981	Holding Barn 1976	Holding Barn 1977
Nestbox & Clay Available	7 February	1 February	Left from '80	Left from '80	Left From Previous Year	Left From Previous Year
Male Offering Food to Female	26 January	4 March	Early March	Early March	January	3 February
Pair's Interest In Box	20 April	3 February	Early March	Early March	January	5 January
Copulation	19 April	20 April	?	?	?	6 February
First Use of Clay on Nestbox	11 May	3 April	18 April	21 April	9 February	21 February
Female Sealed Inside Box	18 May	2 May	23 April	19 May	4 March	2 April
First Sign of Young	3 September (87 days -chick's beak seen)	29 July (81 days-chick's beak seen)	23 July (92 days)	Emergence	No Young (2 eggs with 12 day old embryos)	No Young (or eggs)
Emergence	17 September (122 days after seal up)	27 August (112 days after seal up)	4 August (104 days after seal up)	10 September (115 days af- ter seal up)	16 June (104 days after seal up)	24 July (114 days after seal up)
Young Eating On Own	1 November	7 November	24 August			
Aggression Toward Young	13 Feb. '81 (male to male)	5 December (male to male)	N/A	N/A		
Size of Young	9mos.-370 mm*	8mos.-360mm*				
	1450 g	1240 g				

## BREEDING THE BLACK AND WHITE CASQUED HORNBILL, Continued

The female of the barn pair was sealed in by early March (1976) or early April (1977), whereas the NA and SA females as well as the Birdworld females were sealed in by early to mid-May.

During the May-June incubation period the food intake, especially of the carnivore ball mixture, steadily increased. In June, the average daily consumption of the carnivore ball mixture for the SA pair was 320g (43% of the total), more than twice their original consumption. The fruit consumption for this period remained constant (420g/day).

Live food was also offered during this period. The average daily intake for the SA pair consisted of six pinkies, 12 mealworms and 18 crickets. The NA pair also increased their intake of the carnivore ball mixture, but never accepted any live foods.

This increased intake of higher protein food items during incubation concurs with the observations of Porritt and Riley (1976). The birds were fed twice daily during this period to ensure that fresh food was always available.

In early July, possibly during the rearing period, the SA male began demanding more food. The daily carnivore ball mixture consumption for this period was 620g (43%), with the fruit consumption being 830g (57%). The daily live food consumption also increased to six pinkies, 30 mealworms and 25 crickets. This doubling in food consumption was probably due to the increased demand of the youngsters.

In August, just before the female and young emerged, the SA pair's intake remained the same (810g/day). The carnivore ball mixture represented 37% of the total daily intake, which was comparable to the original proportion before sealing-in.

During July The NA pair has been gradually eating more food when, abruptly on 21 July, 44 days after sealing up, the female stopped accepting any food. This time period approximates the end of incubation reported by Moreau and Moreau (1941) for *Bycanistes*. The male continued to offer the female food during the following days and never showed any signs of abandoning his post. On 24 July she again started accepting food from the male.

Both males were seen carrying objects other than food and clay to the female in the box. These objects were predominantly twigs, but also included grass, leaves, stones and bark. The SA male was seen offering these materials during the three weeks prior to seal-up, but the NA male was only seen offering them during the third week following seal-up.

According to Chapin (1926), West African hornbills never used material to line the nest. Moreau and Moreau (1941) also suggested this for most African species, although they mentioned acceptance of bark chips by the female *B. cristatus* and a nest full of fruit stones. After emergence, examination of the interior of the SA nestbox produced a matted nest primarily of sticks with feathers and shavings that could be lifted out in one piece. This "nest" was 13cm below the hole. The NA box had a similar matted nest but no sticks were used and fewer feathers were evident. These materials were found beneath the nestbox and were presumed to have been pushed out during the female's cleaning of the box or refused when offered by the male.

## BREEDING THE BLACK AND WHITE CASQUED HORNBILL, Continued

When the females emerged, their fine appearance gave every impression of a complete moult. Millar (1921) found that *B. bucinator* used feathers to line the nest, while Cowles (1926) found feathers dropped from the nest. While the NA and SA females were in their boxes, occasional body, flight or tail feathers were found below. Examination of the SA nestbox after emergence produced many body, flight and tail feathers, some incorporated into the nest. Moreau (1937) quotes Pitman as finding a *B. subclyindricus* nest with a naked nestling and a flightless female with primaries all growing in.

During the long period inside the box the female and later her young were seen to defecate with their posterior to the small hole. In the more inaccessible south aviary a fecal pile 15cm deep developed about 1m from the box, with a maximum distance of 2.4m.

In early June, what were presumed to have been fecal sacs from the young were seen being passed by the female to the male, which he then dropped. Sticks and wood shavings were also found beneath the nestbox. On examination of the box after emergence of the birds, there was almost no fecal material and under the surface nest the wood shavings appeared unused.

### EMERGENCE

On 27 August and 17 September, after a confinement of 112 days and 122 days respectively, the SA and NA females broke out of their boxes. On the day prior to emergence, the SA male was seen chipping at the clay and two birds were heard calling from inside. On the actual day of emergence, the male became aggressive toward the keeper when he entered the aviary. The SA female was seen removing clay and was out by 8:40 a.m. The first young, a male, emerged by 9:50 a.m. and the second, a female, by 12:00 noon. All three birds flew well, although both young appeared nervous at first but calmed down after a few hours. The NA female and her young, a male, were out by 7 a.m.

In wild *B. cristatus*, the birds emerged between 7 and 9 a.m. The female took an hour to remove plaster and then she and the male encouraged the young to leave. The female in this case was described as being "shabby and weak" on emergence (Moreau and Moreau, 1971). All the Gray-cheeked hornbill females at the Metro Toronto Zoo appeared in good condition after emergence, which concurs with the observations of Perritt and Riley (1976).

All the young were almost the size of the parents. Their sex was easily discernible, with the males having the characteristic large casque. The shape was different from the adult male casque and blood lines could be seen in the transparent white part of the casque.

The day following emergence, the SA pair were both seen feeding the young, although the young were slow to accept food from the male. In following days the young were vocalizing along with the adult male and moving with confidence around the aviary. The first sighting of a young eating on its own occurred on 7 November, 72 days after emergence. One hundred and one days after emergence, the adult male was seen chasing and harrassing the juvenile male with both vocalizing. No food was eaten that day. Two days later the young pair were removed.

The NA male was aggressive at feeding times for several days following emergence. The young was only being fed by the parents until 1 November,

## BREEDING BLACK AND WHITE CASQUED HORNBILLS, Continued

45 days after emergence, when it began to feed on its own. At 139 days after emergence the adult male was seen harrassing the juvenile male so the young bird was removed.

Porritt and Riley (1976) reported that, at Birdworld, the young rejected the adult male's attempts to feed them. He fed the female who then fed the young. The young in that case were seen eating independently after approximately 40 days.

Following their removal from the breeding pairs, the juvenile NA male was placed with the juvenile SA female in an off-display, bird-breeding unit with the eventual hope of a first-generation breeding.

### 1981 BREEDING SEASON

The two pairs were housed in the same enclosures, offered the same nest-boxes, nesting materials and diet as they had had during the 1980 breeding season.

#### Courting

The initial courting activity of the males feeding the females started in mid-March, with grapes being offered by the males and accepted by the females. Mutual preening was frequently observed during March and April. No copulation was observed during the courtship period.

#### Sealing-up and Confinement

First interest in the nestboxes was observed in early March. The males removed sine if the newly-added shavings and chipped old clay from the nestbox entrances.

In mid-March the SA female entered the box and began housecleaning--chipping away clay and digging nest material to the proper depth. The NA female never entered her nestbox until mid-April, about two weeks before seal-up.

Both males spent brief periods inside their nestboxes in early April. This was the first time we observed this behavior.

The NA male started to seal the entrance hole on 18 April, and the female was sealed into the box on 30 April, after helping with patching the clay/

The SA male started seal-up on 21 April, but the female was not completely sealed up until 19 May. In early May the SA female refused all food offered but instead gorged herself from the food dish. The following day she allowed the male to feed her.

Both males continued to patch clay for about three weeks after the females were sealed in.

As with the case the previous year, the consumption of animal protein increased significantly (40%) during the May-June incubation period. Live foods (pinkies, crickets, mealworms) were accepted only by the SA male.

On 11 June, 50 days after seal-up, a white eggshell was found on the ground under the nestbox of the NA pair. On 22 July the first positive sighting of a youngster was made, 92 days after seal-up. The food consumption of the pair had risen gradually from the 50th day of seal until mid-July, when it leveled out.

## BREEDING THE BLACK AND WHITE CASQUED HORNBILL, *Continued*

The only evidence of hatching from the SA pair was the increased demand for food and the quantity of feces piling up below the nestbox. The male became aggressive toward the keepers when food demand was greatest, and attempted to catch house finches that came into the aviary.

### EMERGENCE

On 4 August, 104 days after seal-up, the NA female broke out of her nestbox and was found on the aviary floor at 7:10 a.m. Her abdomen was swollen and filled with fluid. She dies later that day. Inflammation of the liver and body cavity (hepatitis and peritonitis) were diagnosed on post mortem. The cause is unknown.

The NA male attempted unsuccessfully to feed her on the ground until she was removed. He did feed the chick which remained in the nestbox. The chick did not accept any food on 7 August, and the nestbox was lowered and a fully fledged female chick was observed and looked quite healthy. The box was raised again and the chick had emerged by 7:15 a.m. on 8 August, 108 days after seal-up. She fed herself occasionally throughout the day. On 9 August she allowed the male to feed her, and by 24 August was completely independent.

The SA female emerged on 10 September, 115 days after seal-up. She started chipping clay away at 7:00 a.m. and emerged by 10:50 a.m. One male chick was seen at the entrance and emerged at 2:20 p.m.; another male chick came out of the nestbox at 5:00 p.m. Both flew well and accepted food from the SA adult male the following day. The SA female rarely fed them during this time, and they took most of their food from the SA male until his death on 30 November (no apparent cause), when they became independent.

### SUMMARY

The availability of a suitable nestbox (filled with wood shavings), clay and diet were instrumental in the breeding of the hornbills. The larger nestbox in the south aviary was able to accommodate a female and two large fledged young in two successive seasons and therefore is recommended. Furthermore, the nestboxes were the highest perching points in each aviary, and offered the birds security.

The wood shavings in the nestbox were adjusted by the hornbills to the level they desired. A supply of moist river clay was always available once courtship commenced.

Although the maintenance diet consisted primarily of fruits, at times during the confinement the amount of animal protein doubled and represented up to 45% of the total intake, dropping back to 37% when the female and young emerged. Fruit consumption remained constant at that time, but the overall increase in food consumption was accounted for by the increased number of birds.

The two pairs of hornbills in the African Pavilion nested at a different time than the pair in the barn. The dates and times of the significant reproductive events are tabulated and compared in Table II. From the information in this table it appears that the majority of pairs sealed-up in May and emerged during late-August or early-September, after 112-123 days of confinement.

## BREEDING BLACK AND WHITE CASQUED HORNBILLS, Continued

Early emergence from the nest cavity has been reported frequently. Porritt and Riley (1976) mentioned captive Black and White casqued hornbills breaking out after only seven days in 1973, with successful seasons in 1972 and 1974. Moreau and Moreau (1941) cite a pair of *B. cristatus*, in four consecutive seasons, breaking out from 20-86 days after sealing-up, but successful seasons followed. No apparent causes were mentioned.

The pair in the Metro Toronto Zoo holding barn had two unsuccessful seasons. In 1976 the female emerged after 104 days, leaving two eggs. The eggs were dull white with a pitted surface, measured 493mm x 374mm and contained rotting embryos, one-third developed. In 1977 the same female emerged after 114 days with neither eggs nor young. However, in neither year were shavings used. Seal-up is obviously no guarantee of success.

According to the International Zoo Yearbook, Birdworld, Farnam, England; Wassenaar Zoo, Netherlands; Berlin Zoo, West Germany; and Jurong Bird Park, Singapore, have all bred the Black and white casqued hornbill, but the sub-species was not specific.

### ACKNOWLEDGEMENTS

We would like to thank John Carnio and Susan Guinn for their criticism and help as well as the African Pavilion staff for their invaluable records and care.

### TABLE I: Products Mentioned

Metro Toronto Zoo Carnivore Mixture - 93% Horsemeat

7% Carnivore Supplement Powder

Carnivore Supplement Powder - manufactured by United Co-operatives of Ontario, 151 City Centre Drive  
Mississauga, Ontario

SA-37 Pet Supplement Powder - manufactured by Rogers/STB, Division of  
BTI Products, Inc., London, Ontario, Canada

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WILD FELID MANAGEMENT AT  
HOWLETTS ZOO PARK

By  
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INTRODUCTION

Howletts Zoo encompasses 50 acres of the Kent countryside and is owned by millionaire gambler John Aspinall. It is basically a specialized collection concerned mainly with Gorillas, African Elephants and Wild Felids.

At the moment, we maintain 74 specimens of 16 species, sub-species, and color phases of Felids, 11 of which are endangered. The 16 are Siberian tiger, Indian tiger, Indian leopard, Black leopard, Amur leopard, Snow leopard, Cheetah, Clouded leopard, Northern European lynx, Siberian lynx, Caracal lynx, Serval, Jungle cat, Ocelot, Leopard cat and Marbled cat.

HOUSING

All the cats at Howletts have access to their outside cages 24-hours-a day all year round, and none of the indoor accommodations is heated. Most of the indoor shelters are very basic insulated wooden huts and boxes. Each is custom-built around the particular space requirements of each species. That is, room for one adult and a litter of young.

The boxes for the smaller species have a wooden baffle inside the entrance creating a dark draught-free sanctuary. During the winter and when females have young, they are supplied with straw as bedding material. The size and nature of the boxes coupled with the straw and the animals' body heat makes for a reasonable temperature in the boxes even in the coldest weather. (H)

The cage dimensions vary with each species, some of the tiger cages are over one acre including a large pool. The leopard cages average 30 feet high, since these animals are more at ease and make a better display when they are well off the ground.

The majority of the smaller cats are kept in cages 30 feet long by 18 feet wide to 30 foot square, and vary in height from 8 feet to 20 feet. All the cages are grass or sand floored.

Due to the size of the cages and the zoo's policy of pandering to the animals' every need, even when this conflicts with the public's interests, the enclosures are serviced only twice a week and the straw is changed in the sheds only when necessary. This provides the animals with a minimum of interruption to their daily routine and much less stress from frantic scent marking. Also about forty percent of the cages are in off-exhibit areas.

## WILD FELID MANAGEMENT AT HOWLETT'S ZOO PARK, Continued

### DIET

At Howletts we feed a wide variety of meat to the cats including whole chickens and rabbits, horse, donkey, cow, calf, sheep, goat and pig. All the feed is either old, dead, sick, stillborn or unwanted stock that we pick up from local farms. Now is a country where the majority of captive Felids are fed sterile, accurately weighed lumps of processed meat, this may come as something of a shock. As yet we have had no problems with the cats concerning the nature of the meat, since most of it would be declared unfit for human consumption by a health inspector.

In the wild a carnivore's prey includes a high percentage of old or sick animals. They seem at Howlett's anyway to have an active enough immune system to deal with the nature of their food.

All the meat is dusted with a proprietary carnivore vitamin supplement and cod-liver oil. Females with un-weaned young are given colostrum, calcium, and vitamin D supplement in milk every day.

We strongly believe that mental nutrition is as important as physical nutrition. When was the last time you saw a snow leopard go through the actions of killing its Zuprees before consumption? Since much of the meat is freshly killed and still warm when the cats get fed they go through rather complex behaviours of killing and hiding the food before eating it. Then they get a chance to deal with skin, bone, and entrails as well as the muscle meat. So at least at Howletts millions of years of digestive evolution gets a chance to work.

The feeding schedule is also different from most zoos. The tigers are fed every 5 days, the leopards twice a week, and the small cats 3 or 4 times a week. The meals are large enough to take 2 to 3 days to consume, so there is a starve period before each meal.

During the summer we usually go for short spells with no farmers calling with sick or unwanted stock, so the starve periods are longer. The tigers once went 18 days without food with no ill effects, just an increase in activity.

### HEALTH CARE

So far at Howletts we have had no health problems with the cats to speak of. The only precautionary measures we take are inoculations and worming. We use modified live virus vaccine that covers viral rhinotracheitis, calicivirus, and panleukopenia. Young cats are vaccinated at 12 weeks old and adults upon arrival and during routine catching procedure.

We worm the cats every 3 months using a piperazine powder applied to the meat. As yet all the fecal samples we have had done, have come back negative. Even though all the cats are permanently on a dirt floor, none of them show any kind of susceptibility to any parasites that may be there, including the snow leopards.

Since we feed all the cats meat which is still attached to skin and bone, we have no tartar build-up on their teeth. So there is no need to subject them to the risk of darting because of the need for a routine scraping.

BREEDING

At Howletts we prefer to keep most of the cats separate except when the female is sexually receptive. The introduction of the male to the female can sometimes lead to her death if certain precautions are not taken. Before introduction the animals are kept in adjacent cages where they can see and smell each other and only when the female is near the peak of her cycle should the connecting door be opened.

Clouded leopards are notorious for this in many zoos. We have a male who has killed and scarred females, but when these simple rules are followed he had been no problem to the female at all.

When a cat is pregnant the main requirement is privacy. Just forget all about her and let her get on with it. In many texts on zoo management it is accepted that prima-parous felids are usually unsuccessful. I believe there are certain reasons for it, firstly the staff was unaware of the pregnant state of the cat and routine cleaning and shifting operations continue until one day the keeper unwittingly interrupts the female during birth or the crucial period when she is becoming acquainted with the ins and outs of dealing with these small moving objects and she kills or abandons them. Secondly, the staff are aware that the cat is ready to give birth so they wish to keep a close eye on her and the cat never gets a minute's peace. And if by some miracle she manages the birth process, cleans the cubs, and starts to feed them along comes the chaps in white to weigh and measure them and an onslaught of trigger-happy zoo photographers. In all the articles on clouded leopard breeding in the International Zoo Yearbook, everytime they weighed the youngsters the female killed them within a couple of days. A high price to pay for some useless information.

Most of our cats go through very similar behaviors just before parturition. Four days prior to birth their appetite virtually disappears and two days prior they spend all their time in the cubbing box. A week or so before all this, the area around her is completely sealed off to staff and public, and all cleaning operations are suspended. If the animal still remains out of sight after the suspected birth date, we just assume she has kittens and leave her well alone.

The only drawback with this system is that if something should go wrong with the birth process, then you could lose the female. But the chances of this are slim enough that we feel our actions are justified. Of course closed circuit television in the breeding dens would be able to tell us of any problems, but that is a luxury we do not have at Howletts. We make our first brief inspection of the kittens at 6-8 weeks and cleaning operations continue sometime after that.

Conversely we keep the tigers in permanent family groups, the male runs with the female from the first day the cubs are born. As long as there is another place for him to shelter, he stays well clear of the youngsters for the first few weeks. After about 10-12 weeks the adult male will participate in active play behaviors with the cubs that is very similar to that of an adult male lion.

Running tigers in family groups has two main advantages that I can see: it is a great display for the public and conserves cage space that would be required for the male. So using this technique a zoo would be able to increase its carrying capacity of Siberian tigers and make a greater contribution to the conservation of this animal that is threatened by inbreeding and injudicious birth control techniques.

Sometimes with a small cat species, we use live feeding of chickens as a breeding stimulus. The cats become excited during the kill with the adrenal glands working overtime, they stimulate the pituitary which in turn produces the sex hormones, hopefully stimulating estrous in a difficult female. At least that's the idea behind it.

CONSLUSION

In conclusion, using these various management techniques we have achieved a breeding success of about 80 percent with most of the cat species at Howletts. Some of you may find these methods haphazard and in the long run detrimental to the long-term breeding success of the cats, but since Howletts has been using this kind of animal husbandry since the early 60s, I think it speaks for itself.

Obviously the manufactured diets used in this country do result in exceptional breeding success in certain zoos, but do the animals act like their wild counterparts? And with the longterm view of reintroduction will these "modern" methods not prove detrimental to any such program?

It is also noteworthy to mention that we will soon be receiving fishing cats, African golden cats, and possibly blackfooted cats. All of these will be managed using the same methods, and hopefully with the same results.



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**AN INVITATION**  
FROM YOUR EDITOR

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Do you have a suggestion which will help make a keeper's job quicker and easier and life for the animals more comfortable and safer? Send any suggestions to : Rick Passaro, Rt. 3, Box 733, Front Royal, VA 22630. Selected ideas will be chosen for publication in Animal Keepers' Forum in a forthcoming new column entitles "Keeper Tips". Let's hear it!

GROOMING BEHAVIOR IN A CAPTIVE GROUP OF HAMADRYAS BABOONS  
(*Papio hamadryas*)

By  
Anthony Vecchio, Cat & Bear Keeper  
Riverbanks Zoological Park  
Columbia, South Carolina

Zoos have undergone a rapid evolution over the past few decades. Entertainment and recreation, though still a vital purpose served by zoos, are no longer the top priorities that they once were. The important role that zoos play in conservation, education, and research is finally being realized. Keepers, because of their unique position, can have a major impact on all three of these areas. Knowing the animals so well and working so closely with them puts the keeper in a position to make significant contributions in the exciting and rapidly growing field of zoo research. This not only means being an aid to professional researchers, but also contributing by designing and implementing original research projects. The purpose of this paper is to discuss the research on grooming behavior that is presently being conducted on the Riverbanks Zoo's Hamadryas baboon troop. The emphasis being not only on the hypothesis and results of the study, but also on techniques and problems that are involved with a keeper-run project.

Riverbanks houses two species of baboons, the Hamadryas baboon (*Papio hamadryas*) and the Mandrill (*Papio sphinx*). Several on-going observational research projects are being conducted with these animals. The project discussed in this paper concerns the dynamics of grooming behavior in the Hamadryas troop and how it relates to changes in the estrus cycles of the troop's females.

Riverbanks' Hamadryas troop consists of six individuals: an adult male, four adult females, and a juvenile male. The adults were born in 1973 in Ethiopia and have been at Riverbanks since 1974. The juvenile male was born at the zoo in May 1980. They have an open air exhibit with approximately eighty square meters of space plus various ledges, cliffs, and snags. At night they are brought into a temperature controlled barn where they have about ten square meters of floor space plus sleeping shelves. This study was started on 3 February, 1982 and is on-going.

The females have an estrus cycle that averages thirty days in duration. The perineal swelling develops in five to seven days and remains at its height for seven to ten days. Ovulation occurs at the end of this time (Zuckerman, 1930). The swelling is very obvious (25-35cm in diameter) which makes monitoring of the cycles very easy.

Baboons live in troops and display a very complex social system. Hamadryas are unique among the baboons in that the troops break up into one male units, an adult male with a group of females with their infants and juveniles, as opposed to the typical multiple male groups of the other baboon species (Kummer, 1968). The relatively high activity level and their other complex social behavior makes these animals excellent specimens for behavioral research projects.

METHODS:

In the winter of 1981, I started recording the durations of the different stages of the estrus cycles of Riverbanks female Hamadryas. This was done just to get data on length of gestation, lactation, and average length of the estrus cycle. Upon comparing casual observations on troop behavior with

the day to day records of estrus cycles, it soon became apparent that behavior seemed to change along with changes in the females' cycles. For example, virtually all of the serious aggression (fights or disciplining by the adult male that required veterinary attention) occurred when one of both of the low-ranking females were in estrus. This prompted me to conduct a more structured research project to try to determine how much of an effect changes in estrus cycles had on social dynamics of the troop.

The first step in the project was to determine the social hierarchy of the troop. A common method for determining dominance in social animals is to observe the group and record the number of approach/retreat interactions. A pecking order can be determined by assuming a less dominant animal will retreat at the approach of a more dominant animal (Rowell, 1966). This method, though very useful in the study of wild animals, may not be appropriate for a keeper-run project. For one thing, the limited space and structured routine of zoo life may interfere with the normal approach/retreat process. Also, the keeper would not be able to spend the large amount of time necessary to accumulate enough data on this preliminary step in the study. What I did was to give two animals equal access to a favored piece of food. By recording which animal would invariably get the food after several tests, a social order could be determined in a short time.

Grooming is the most obvious and time-consuming form of social behavior in primates (Altmann, 1980). As such, it can be used as an indicator of the social dynamics of the troop. So, continuing to record the state of the females' estrus cycles, I also began to record grooming activity. Whenever a grooming interaction was observed I would record it in a notebook and later transfer the data to charts kept in the barn. The charts consisted of blank columns where information on who was being groomed, who was doing the grooming, date, time, and location could be filled in. Also on the sheet was a column marked "comments" where any relevant data could be added, such as state of estrus cycle, aggressive behavior, or sexual behavior. This method of data recording, that I will refer to as the "zoo keepers ethogram" offers some special advantages and also problems to the keeper doing a study.

The usual technique for doing an observational study on animals is to use a zoo ethogram (DeCoursey, 1980). Basically, this involves the researcher observing a group or individual over a period of time and recording data at marked intervals. This gives a set of continuous data; not only can the researcher observe a behavior that he is interested in but also the behaviors that lead up to or follow that behavior. It also gives a good idea of the percentage of time an animal spends at a particular activity.

Rather than use this technique, I opted for the collection of point data, zoo-keepers ethogram, for practical reasons. Mainly, there are few curators who would allow their keepers to spend hours a day observing an animal and neglecting their routine work. So, though a few ethograms were run just to give a broader data base, I concentrated mostly on the zoo-keepers ethogram. The major advantage of this approach is that it takes full advantage of the keepers' unique position. There are keepers present nine or more hours a day, seven days a week. So, rather than collecting continuous data over short time periods, the researcher is collecting point data spread out over a much larger period of time. Hopefully, data

will be gathered in many different situations that could easily be missed by the use of the standard ethogram. The drawback to this method of study is that by looking at one or several observations the researcher gets no idea of overall proportions or percentages, such as which animal does the most grooming. To compensate for this and to get results that will be suitable for statistical analysis, the observer must collect a very large amount of data.

One of the restrictions to this method of study causes observations to go unrecorded at times. This event occurs when several grooming bouts are going on at the same time but the keeper may not be able to identify one or more of the animals. The rule is that if the researcher cannot identify all the animals involved in grooming activity at one time, he should not record any of the observations. If this rule were not followed, the data would tend to be selective for the animals that are easily identified such as the adult male and upon analysis, it would appear that these animals were involved in a higher percentage of the grooming activity. Adult female baboons can be difficult to identify from a distance so it is important for the researcher and anyone assisting in the gathering of data to be very familiar with the animals. The results discussed in this paper are based on the first one thousand observations. Hopefully, in the future, as we collect more and more data, patterns of troop behavior will become even more clear and predictable.

#### RESULTS:

This study had yielded some very exciting results. Some of the things that we learned are things that have been observed by other researchers and are recorded in the scientific literature. Other things are in direct contradiction to previous research. The social hierarchy of the baboon troop is not a static phenomenon. It is more of a dynamic process with the roles and characters of each animal causing many different possible reactions to different situations. This complexity makes it difficult to compare one group of animals' behavior with another's. The results discussed here were observed in Riverbanks baboon troop. They may or may not apply to other baboon troops in the wild or in captivity.

The origin of grooming behavior probably centered around the removal of ectoparasites and dead tissue from troop members for consumption by the animal doing the grooming; an interaction that benefits two or more parties. This utilitarian function still occurs (Hutchins and Barash, 1976). But over time a great social significance has developed as part of grooming. Today, most workers consider the social aspects to be the main function of grooming. Grooming is important in maintaining troop cohesion, sexual bonds, and mother-infant bonds.

Because of these various functions it is difficult to interpret any specific interaction. None the less, our research has turned up some general tendencies, some obvious and predictable, others more subtle and obscure.

The most obvious aspect of the study is the grooming frequency. The alpha male is the recipient of the most grooming. The juvenile (2-year-old) male receives and performs the least grooming. The implication here is that position in the social order may correspond to the amount of grooming an animal receives. However, this does not hold up when the grooming frequencies among the females are examined. There is no signifi-

## GROOMING BEHAVIOR IN A CAPTIVE GROUP OF HAMADRYAS BABOONS, *Continued*

cant difference in the amount of grooming received by females. There is a slight tendency, though, for a linear relationship between rank and amount of grooming. The factor that distorts this tendency is that the lowest ranking female is second in amount of grooming received. Perhaps as more data come in we will be better able to analyze this relationship.

A relationship that has proven to be more clearly defined is that the baboons tend to groom their equals or neighbors in the social hierarchy. The alpha male grooms the alpha female, the alpha female grooms the alpha male and the beta female. The beta female grooms the alpha female and the lower ranking females, etc. Looking at this it would seem that direction of grooming would be very predictable. However, the changing estrus cycles of the females complicates the predictability. When a female baboon comes into estrus her position in the social order does not change. She does, however, become more attractive or more acceptable to the higher ranking animals. The alpha male virtually ignores the three lowest ranking females when they are in anestrus but grooms them as much or more than the alpha female when they are in estrus. The reason for this change in the male's behavior may be to increase his chance of reproduction. Baboons are multiple-mounters, that is the male ejaculates after a series of mountings (Saayman, 1971). Grooming between the male and the estrus female may be a means of keeping the animals in close proximity until ejaculation is accomplished. It is less apparent why the estrus female would become more attractive to higher ranking females. And, despite this increased attraction, why all of the serious aggression occurs while the low-ranking females are in estrus.

This data on grooming frequency carries the implication that the animals are aware of their place in the social order and seek out specific individuals, their social neighbors, for grooming. For example, the beta female wishes to be groomed so she seeks out the alpha female and either grooms or solicits grooming. The information obtained from the ethograms indicates that this may not be the process that determines grooming frequency. It seems that the baboons groom or solicit grooming from the animals that is nearest to them. And it is the social order that determines which animals will be in close proximity to each other. So, unless another female is in estrus, the highest ranking female is to be found close to the male and receives most of his attention.

Jummer, in his field work in Ethiopia, observed that Hamadryas baboons gathered in large numbers at sleeping rocks. In the morning the animals would congregate at the tops of these cliffs and all leave at the same time. It was during this time of congregation that all of the day's grooming activity occurred. There was almost no grooming after the animals went out foraging in their one male units. We found, that except when eating and when the weather was extremely hot, the baboons groomed with equal intensity throughout the day. This may be an artifact of the captive situation. When the Hamadryas were given browse material (bamboo) and toys (small blocks of wood) there was no grooming observed. This may indicate that the increased grooming in captivity may be a result of boredom.

After analyzing the amount of grooming compared to the location it became apparent that the lowest ranking animals never groomed while in the back-up cages. This may be because the lower ranking animals are more intimidated by the presence of humans, and we had to be much closer physically to make observations in the back-up than when the animals were on exhibit. This could have a serious effect on similar studies in which the animals are always close to the public.

## GROOMING BEHAVIOR IN A CAPTIVE GROUP OF HAMADRYAS BABOONS, Continued

Another aspect of our study, which was unintended originally, was the change in grooming frequency when animals are removed and returned to the troop. The alpha male and juvenile male showed no change in grooming frequency when returned to the troop after a separation. The females, however, all showed a dramatic increase in grooming upon their return to the troop. It would seem that this is important for the females to reestablish their membership in the troop's social order after a separation. But the alpha male who is clearly the group leader and the juvenile male who has a very tenuous position in the hierarchy do not have that strong need.

It should be recognized from this study that grooming behavior is quite complex and is probably influenced by many factors. Some of these influences may be so subtle that we could never recognize them. It is important not only to be vigilant but also to record any observations. It is this written record that will show the trends that occur over long periods of time. The more in depth the written record the more difficult it will be to work with, but also the more likely it will be to reveal reasons and motivations for specific behaviors.

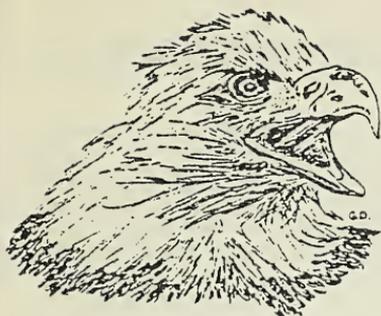
### ACKNOWLEDGEMENTS:

In conclusion, the briefest and most often overlooked section of any paper is usually the acknowledgment section. This is a shame. Designing, conducting, and analyzing a research project is a time-consuming and difficult task. A person working alone would be overwhelmed by the amount of work involved. For example, the data that this paper was based on would be reduced by 60% if it were not for the diligent observations made by Keepers Diane Krug and Gordon Murphy and Senior Keeper John Croxton. Many of the ideas and conclusions discussed were the result of questions and criticisms that arose in what seems like an almost constant baboon discussion with John Croxton, Kathy Bell, Diane Krug and Gordon Murphy. Finally, vital support, more and financial, were the result of the concern shown by the Riverbanks AAZK Chapter and the Riverbanks Zoo administration, particularly Zoologist Alan H. Showmaker and Director Palmer E. Krantz, III. In conclusion, to do the best possible job the researcher must draw upon all available resources. The most important of which are the people with whom he works.

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SUCCESSFUL BREEDING OF GOLDEN EAGLES  
(*Aquila chrysaetos canadensis*)  
AND THEIR SUBSEQUENT RELEASE

By

Bill Hunt, Keeper of Birds  
Abilene Zoological Gardens, Abilene, TX

On 20 August, 1980, two young American Golden Eagles spread their six-and-a-half-foot wings and soared for the first time out over the Pisgah National Forest in western North Carolina. Occasionally frequented by migrating or wintering eagles, the Great Smokey Mountains have not known the Golden Eagle as a breeding species for probably a century. The young birds recently released are part of an effort to restore a breeding population of Golden Eagles in the East. The Abilene Zoological Gardens had the privilege of hatching and supplying these particular birds.

Although Golden Eagles are normally great travelers, these birds had made a remarkable odyssey in their first few months of life. Hatched by their natural parents in Abilene, Texas, the two young birds, or eyases, at one month of age were carried by auto to Illinois. There they were introduced to an adult female Golden Eagle, which has lost the power of flight but retains its maternal instincts. After a get-acquainted period, the one adult and two juveniles were transported to the hack site when the eyases were sixty days old. Six weeks later the nearly full-grown eaglets were given freedom to try their wings against the winds of the Eastern mountains.

The prime ingredient for breeding Golden Eagles is patience. I can't claim this virtue for myself in any large measure! One of the other keepers at the Abilene Zoo, Mark Fox, observed and recorded behavior of the adult pair for four breeding seasons before this year's successful hatching!

Brown and Amadon in Eagles, Hawks and Falcons of the World state that immature Golden Eagles often frequent the location of actual or potential nest sites for several years before mating. While our birds are not immatures, they followed the pattern of very deliberate progress toward successful mating. Tom Buchanan, General Curator of the Abilene Zoo, considers this extended period as necessary for learning. A great deal of aggression must be safely sublimated before copulation and effective parenting can occur. In this lifetime pair-bonding species, courtship behavior, such as food transfer, serves to displace aggression and build confidence. This gradual process must be initiated, but is apparently not as difficult, each breeding season. Such a time-consuming process might be considered damaging to the survival of the species. But since Golden Eagles that survive the first four years may live to age fifteen or more, a successfully mated pair is often able to produce many offspring.

Each of the Abilene birds has a life history that posed additional problems for its successful breeding. The male had been taken as a late eyas for falconry before 1972 Federal regulations were imposed. He was trained for hunting and also used for educational purposes until 1976. The female had been the mascot of the Abilene High School "Eagles," and as such had been crated and carried about to football games and pep rallies. She had earlier been wounded by a gunshot, in addition to the trauma she experienced as a captive.

SUCCESSFUL BREEDING OF GOLDEN EAGLES AND THEIR SUBSEQUENT RELEASE  
(Continued)

These unlikely candidates for parenthood were placed together in a newly constructed flight cage in the autumn of 1976. This enclosure is 54 feet (16.2 m) long and descends from fifteen feet (4.5 m) in height at the back to twelve (3.6 m) in the front. It is sixteen feet (4.8 m) wide at the back, narrowing to seven (2.1 m) in the front. This unusual shape was designed to present very visible limits to the flying eagles, in an attempt to minimize collisions. In addition, a special extruded wire was used that lacks the sharp, foot-cutting edges of normal chain-link.

A wooden nest platform was built in the crotch of an unrooted tree, sheltered by and about halfway up the stone wall that forms the back of the flight cage. A few sticks were placed in the nest and others made available on the ground. A large log perch spanning the entire width of the cage was designed to provide an easily accessible and stable copulation site. All observed copulations have, in fact occurred on this horizontal beam covered with AstroTurf. Other perches made of two-by-four lumber are located strategically about the enclosure. These need to be built very strong because of the stress they absorb from these large birds landing on them. A stone and concrete water bowl is provided at ground level, which can be drained and filled easily. Double door access area is designed to provide security for birds and keepers. Maintenance diet for the adult birds had been whole animals when possible, and otherwise vitamin-treated chicken necks.

The first courting behavior was observed in the early spring of 1978, some fifteen months after the eagles' introduction, and consisted of nest-building. The next spring this activity increased, and was followed by the laying of two eggs. Neither egg hatched, but both were tended by the adult birds until the eggs disappeared from the nest, one at seven weeks and the other at ten.

In the spring of 1980 courtship behavior intensified. Flight displays, food caching at the nest site, increasing aggression toward humans and attempted copulations were prominent features. Beginning on the second of April, the female laid three eggs, three and four days apart. Eight weeks later all three intact eggs were removed from the nest and examined: two were infertile and the third showed arrested development at an early stage.

In 1981, again around the first of April, two eggs were laid. On the forty-first day of incubation, the first egg hatched and the downy white chick was observed. The young bird survived only three days, however, and died, we surmise, as a result of parental ineptitude: either fed inadequately or crushed by the weight of the brooding hen. The second egg was pulled three weeks later and found to be infertile.

The 1982 breeding season arrived for two adult eagles with a well-established pair bond and a record of gradually improving competence in mating and parenting. Continuing their now predictable behavior, our eagles laid their first egg on 29 March. Second and third eggs followed on the 31st and 5th of April.

The parents shared incubation duties, until the forty-second day when the first egg hatched. The second egg pipped the following day and suddenly we had two eaglets! Anxious about a repeat of last year's neglect, we set up early morning and late evening watches to monitor feeding behavior. I evoked many a strange look from my fellow keepers who saw me perched with binoculars on top of the Polar Bear house!

## SUCCESSFUL BREEDING OF GOLDEN EAGLES AND SUBSEQUENT RELEASE

*(Continued)*

To our relief, the male bird was observed just before sunset tearing bits from a chicken breast and feeding them carefully to the weak and peeping chick beside his large yellow feet. With great care, both parent birds moved about the nest with their massive talons drawn up almost into a fist to avoid damaging the chicks. This scene was repeated shortly after daybreak, again by the tiercel, until it was obvious that the young birds were definitely being fed. In fact, the older chick was soon easy to distinguish because of the messy red stain on his head and breast -- evidence of clumsy but adequate feeding.

On the tenth day after the first hatch, a different crisis reached urgent proportions. Chick A was becoming increasingly aggressive toward Chick B. Without provocation, the older sibling would grasp the down of the younger one's back in its beak and shake its head vigorously. In spite of constant retreats to the very brink of the nest, the victimized chick soon had a raw patch the size of a half-dollar on the middle of its back. Impressed by statistics in the literature that, "In about 80% of cases where two young hatch, the elder kills the younger," (Brown and Amadon, p. 668), we determined to withdraw the injured eaglet and to raise it by hand.

Cutting a window in the chain-link opposite the nest platform, we retrieved the chick in a homemade scoop. Neither parent gave us any trouble while we robbed the nest. The chick was bloody but not seriously wounded. Given a little antiseptic spray and removed from further harassment, it was as good as new in a couple of days.

The younger chick was kept in a large incubator and fed finely chopped chicken four times a day, including one at about 10 p.m. for ten more days. The quantity of food was intentionally limited so that it would not overly distend the crop, and Avitron vitamin drops were given once a day. Efforts were made to screen the keeper from the bird's view, in order to minimize imprinting. The bird showed steady weight gain until at 32 days of age, we surrendered custody of it to Bill Volker of the Eagle Propagation Project.

Just prior to date of departure, the older eaglet was taken from the nest, again without aggression from the parents. The opening in the wire had to be enlarged before we could remove this fast-growing bird, however. Only when we had the juvenile in hand could we see how large it really was. It weighed 1074 g. compared to 575 g. for the hand-raised chick! Obviously the natural parents were not so fussy about their offspring's eating habits as we were! In addition, it was later ascertained that the older bird was a female and the younger a male. The two young birds spent their last three days at the Abilene Zoo in high-sided apple boxes, where they continued rapid weight gain until their departure on 12 June.

The exact location of the hack site is not known to me, nor would it probably be helpful to publicize it. It lies in the mountainous western tip of North Carolina, in the area given by A.C. Bent as the southern and easternmost range of the Golden Eagle. In an attempt to trace the extent and fate of the historic population of eagles in this area, I wrote to Thomas R. Porterfield, Wildlife Management Biologist for the North Carolina Wildlife Resources Commission. I cannot do better than to quote from his letter sent in response to my questions.

"Golden Eagles are frequently observed in western North Carolina during migrations, and a number of Golden Eagles usually winter in the area. Favored habitats are the grassy balds which often occur on mountain tops

## SUCCESSFUL BREEDING OF GOLDEN EAGLES AND SUBSEQUENT RELEASE

*(Continued)*

at elevations of 3,500 to 6,100 feet. The balds provide excellent hunting areas for Golden Eagles, and many suitable nesting sites are available. However, Potter, Parnel, and Teulings in Birds of the Carolinas stated that no breeding had been documented in either state. Life Histories of North American Birds of Prey by Arthur Bent mentions nesting in the mountains of West Virginia, Virginia and Tennessee.

"Many local place names indicate that early settlers found eagles throughout western North Carolina. These include: Eagle Creek in Swain County, Spread Eagle Branch in Graham County, Eagle Fork in Clay County, Eagle Nest Mountain in Haywood County, Eagle Cliff in Mitchell County, and Eagle Rock Cove in Buncombe County.

"Public attitudes toward eagles and other birds of prey have improved greatly in western North Carolina. Fewer people attempt to destroy birds of prey than in past years, and we have received overwhelming support for the hacking project. Hunters, fishermen, hikers, and landowners in the area have generally been very supportive. I believe that publicity from the hacking project has increased public awareness of the necessity of protecting birds of prey and their habitat."

Obviously the release of two sibling birds into this vast area, considering all the attendant risks of a young raptor growing to maturity, will not be sufficient to establish a viable breeding population. We at the Abilene Zoo hope in other years to furnish other young eagles to join the "class of 1982" in populating the grassy balds of the Great Smokey Mountains. I feel sure that the contributions of other producing zoos would be more than welcome.



## **Bears are being slain for their paws and claws**

The California black bear is under siege. Hundreds, maybe as many as a thousand, have been killed by poachers operating throughout the bear country of California and other western states, and the population is clearly suffering. This shocking slaughter is spurred, it seems, by Asian-American dealers in Los Angeles. The bear's claws, paws and gall bladders are highly prized.

Many Oriental people consider the paws a delicacy, value the claws as jewelry and believe the gall bladder is a sure cure for any number of ailments ranging from hepatitis to toothache. Agents of California's Fish and Game Dept. suspect that exports are finding their way to the Far East where a bear gall bladder can fetch as much as \$3000.

The fear is that growing prosperity in the Far East and growing unemployment in America's bear country may combine to accelerate poaching in the western states. The hunting season, one bear per hunter, is limited to October and November. But illegal hunting is on the increase -- "We know because we find dog tracks out of season," says Wayne Klein of Fish and Game -- and bears are getting smaller and younger. Females do not begin to breed until they are five, and the average age is now only four.

Judge Newson of the California District Court of Appeals in San Francisco has criticized the \$14,000 fine imposed on three men convicted of buying bear bladders, paws and claws. He believes that convicted poachers should be jailed. A bill before the state legislature would make bear poaching a felony.

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Vol. 31, No. 3, Summer 1982*

## TRAINING THROUGH STAFF EXCHANGE PROGRAMS

By  
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Thank you. You, know, those words are so often used as a polite expression, with no meaning behind them; and I want you to know that I really do thank you for your presence, for I know that you are here, not to be entertained, or for any frivolous purpose, but out of your deep commitment to professional animal care. And I am moved and inspired by your deep commitment. And I acknowledge you fully for that.

I thank you specifically for being willing to listen to what I have to say. We're going to be working hard for the next few minutes. You and I are going to create a context in which this project called Staff Exchange Program can occur, and a lot of the stuff will be conceptual--will go beyond concept--and you need to be here in the room with me, with your full attention on what's going on. To that end, I invite you to ask questions as we go along. I don't want you hanging out there, puzzling over and distracted by something that could be cleared up in a few words.

I have a wonderful surprise for you: I am not going to show slides. I am not going to read a paper to you. I'm just going to be up here, pretending I know something you don't know, and pretending to lay it on you.

So: having said I won't read to you, I am now going to read to you:

From Random House: CLIMATE n. 1. the composite or generally prevailing weather conditions of a region, as temperature, air pressure, humidity, precipitation, sunshine, cloudiness, and winds, throughout the year, averaged over a series of years. 2. a region or area characterized by a given climate. 3. the prevailing attitudes, standards, or environmental conditions of a group, period or place.

It is from this last definition that this talk comes. For the prevailing attitudes and standards in the area of wildlife management are in the process of revolution right now. In captive animal management, that revolution is demonstrated by our devotion and commitment to excellence in our profession, visibly manifested as improved exhibits and procedures, an expanding body of knowledge, and a recognition of the fellowship of professional wildlife specialists everywhere.

There is no zoo or aquarium so good that its staff has nothing to learn about the care and propagation of its captive species; there is no institution so small or poor that it has nothing to contribute to the body of knowledge associated with that care. But you and I know how slowly the technology filters out from its sources. And how frustrating it is to seek and find literature and experienced people in whatever specialized area we are asking questions. Look at all the calls for information in Animal Keepers' Forum, for instance: "Help! I need to know about this species--or about this aspect of its care. Send me anything; I don't even know what questions to ask!" That is the communication in so many of them.

Fifteen years ago, the AAZPA Newsletter contained a small article about keeper exchanges, and how neat it would be to get a wide-spread exchange program going. It was a good idea at the time. It's still a good idea. It has not been brought out of the realm of good ideas and put into oper-

## TRAINING THROUGH STAFF EXCHANGE PROGRAMS, Continued

ation. A few institutions over the years have started up such programs. Some of them are still going. Not many. Nobody's been willing to be responsible for having it happen. In any field of human endeavor, a primary ingredient of success is what I choose to call source: one person who stands up and says, "I'm not willing to wait around for someone else. I'm responsible. I'm going to be the one to see it happen." And then do it.

I now find myself in that uncomfortable position. And it is uncomfortable, no foolin'. All I wanted to do was to go to The Wildfowl Trust, Slimbridge, on an exchange. Learn a lot, have some fun along the way, bring back some new knowledge and insight to apply to my job at Woodland Park Zoo. Ha. And I've been stopped. For years. Well, it suddenly occurred to me that it is no longer enough for me to go for my own little goodies, and to hell with the rest of the world. I thought that maybe others at my zoo might also want to do exchanges, and that I could create a way for that to take place. So I surveyed the keeper staff and discovered a high level of interest--plenty to assure me that I had a starting point, somewhere to go with it, and plenty of support. I am privileged to work at a zoo where transformation is the name of the game, and where staff at all levels lend power to those who want to go beyond the limits of their job descriptions. The empowerment available to me is such that everything has been effortless. Lots of work--or play, as I prefer to call it--but effortless.

While this was going on, I became aware of my hidden agenda, or secret plan: I intended to go world-wide with this thing. Surprised me when I found that little gem lurking in my mind. Who, me? Little me? Play the game as a world citizen? Nahhh! But yes. And that is the opportunity I am making available to you now. If the zoo survey results could be taken as a sample of the interest in creating this program, then this is clearly an idea whose time has come. How to find out? Send out another survey.

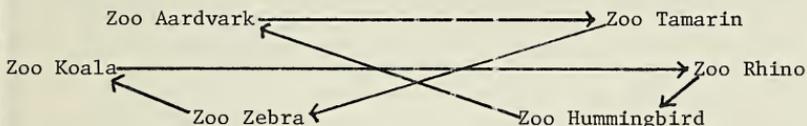
The second survey went to North American institutions listed in the AAZPA directory, it being a compact and readily available list from which to work (our intention is not to limit ourselves to North America). We asked whether they have such a program going; if not, might they be interested in participating? Do they want more information?

For those of you who are unfamiliar with surveys, a 10% response to any survey is considered good, 15% excellent. I decided that a 25% response, good, bad, or indifferent, would indicate enough interest on this continent to get the program going. By the time Tallying Day, 1 September, came along, we had a 58% response! of 198 institutions questioned, 116 responded. Of those, about 15% said they had an exchange program going--mostly just keepers with no other staff participation. (One of our Education Deptment members asked about non-keeper staff participating, and is now in charge of that aspect.) Only eight of the responding institutions indicated that they would not be interested in participating in an exchange program, and some of them explained why not: we're too small to have anything to offer, local rules against it--which indicated to me that they would, except... Not, perhaps, a scientific inference to draw, but I don't pretend to be a scientist. Anyhow, the remaining institutions at least wanted more information, and half of them answered that they would be interested. This continent is clearly ready to play. So we're setting up the game, you and I, right here, right now.

Networking is a practice that has started in a lot of areas in the world,

TRAINING THROUGH STAFF EXCHANGE PROGRAMS, Continued

from businesses and television to consciousness-raising groups. In the world of zoo keeping, specifically in the area of exchanges, such exchanges tend to be linear in nature: Zoo A sends someone to Zoo B, and Zoo B sends someone back to Zoo A, usually workers in the same area of specialization. This is fine, and a lot of exchanges can be useful, done linearly. But I submit that, in many cases, we could achieve optimally effective results through a network of exchanges, so that staff can go where they need to go, to learn what they want to learn, and their home zoo can receive staff according to the areas of specialization where they have the most to teach:



Assuming now that each zoo has one speciality, and that we are dealing only with keepers--here is Zoo Aardvark, which wants to exhibit Tamarins. A keeper goes to Zoo Tamarin, which has no Aardvarks, but which has decided to start an intensive captive propagation program with its zebras. Zoo Aardvark has no zebra, and therefore little technology to share with Zoo Tamarin about either zebra or tamarins. A linear exchange would be less useful than if Zoo Tamarin sent a keeper to Zoo Zebra, which has been propagating zebra for 20 years. But Zoo Zebra is having nutritional problems with its Koalas. Zoo Tamarin is in a climate where eucalyptus won't grow. Zoo Zebra, therefore, sends someone to Zoo Koala to find out about Koala nutrition. Zoo Koala's Rhinos have been suffering from skin and foot problems, so the Rhino keeper from Zoo Koala works at Zoo Rhino for awhile. Zoo Rhino has a keeper who is just not satisfied with his level of expertise about Hummingbirds, or with the rate at which he is learning, and so decides to exchange with Zoo Hummingbird. Zoo Hummingbird's Aardvark keeper just quit, and nobody else knows enough about Aardvarks to care for them adequately. So Zoo Aardvark gets its return on exchange from Zoo Hummingbird.

This is assuming that the home zoo handles wages, insurance, etc. on staff it sends, and therefore wants to have labor come in at about the same rate at which it sends labor out on exchanges. This complicated a transaction, where only keepers and one area of specialization are posited, points up the need for handling such exchanges at a central site, to match up supply with demand for knowledge and skill.

Since I started working on this project, a man named Robert Keel has gotten interested and is now working on it. One of his ideas is to facilitate the search for literature and research material that, for whatever reason, hasn't reached publication. There are filing cabinets in zoo offices and colleges and universities all over the world, filled with unpublished information. Mr. Keel is now in charge of the project, and this aspect is getting into production. We intend eventually to have stored in a computer, abstracts of unpublished papers on captive animal management; to have the actual papers on file and available to be copied and sent upon request; and to have a bibliography of published material to send with the hard copy, thus avoiding redundancy and competition with existing and future journals. The target date for having this project working is January 1983.

Now, sometimes we don't even know what kind of information is worth disseminating. I suspect that there is an amazing number of cases where we

## TRAINING THROUGH STAFF EXCHANGE PROGRAMS, *Continued*

follow procedures, use tools, or have included in the physical facility, features and aspects that we take for granted, but that would be most useful to others. It's just that we've always had it that way, and may not realize its importance.

Case in point: We had a keeper from another zoo at Woodland Park on an exchange. She was amazed that we got to keep specimen records and consult them at any time. She said that keepers at her zoo never got to see those records; keepers write up the information, and it's recorded at a central spot and kept there. Now, I have the idea that it's useful for a keeper to be familiar with his collection's history. I have nearly 100 animals under my care. I couldn't possibly remember every detail of all their histories. And I'd assume, until talking with this keeper, that everybody kept records this way. Well, it may turn out that keeping centralized records is more useful than having keepers maintain them. Or that giving keepers free access is more useful. But without this exchange, it might have been a lot longer before anybody at either institution even realized that there are alternatives.

Going on the results of our survey, I don't think I need to do a hard sell. The interest in and enthusiasm for this program are obvious. And I should mention that the questionnaires were sent to directors, so the interest is there at the senior staff level. We have a starting point. So--Where do we go from here?

Now we are getting into the hard part where we need to go beyond concept and get into areas that, being formless, are impossible to address directly. The best I can do is to talk around them and let metaphor convey the message.

Obviously, it's very easy for all of us to get excited and inspired here in this room where there's lots of agreement about how useful and great it would be to have this staff and technology exchange operating on a world-wide basis. But what about after we get home and there aren't lots of people around, already enrolled in the idea? Let's face it, not everybody will like this idea. There are people out there who are proud of their achievements and who don't want anyone else to outstrip them. There are people out there who are so bound by inertia that it may take what seems like a superhuman effort to overcome that inertia and get anything going. There are people out there who have been stopped so many times in their lives that they've lost their ability to care, their sense of adventure, their knowledge of the difference they can make. And some of them will be in a position to say, "No."

Or, "Yes."

Now, it has been my experience that, whenever I get, or hear about, what I consider to be a good idea, the first thing that I notice about that good idea is that there's always a Reason Why Not, an obstacle. Or Many. Usually many. I could tell you why not for days, rather than get moving on a good idea.

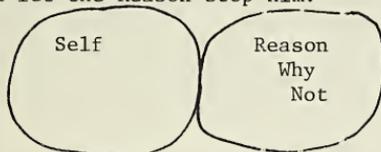
I am not willing to have this thing stop with being a good idea. And I know that there are lots of reasons that this program couldn't, wouldn't, or might not, work. And I know that some of you, while I've been talking, have already identified your particular stumbling blocks, or some of them. And they're all real --they're all valid. So we are now going to handle Reasons Why Not.

TRAINING THROUGH STAFF EXCHANGE PROGRAMS, Continued

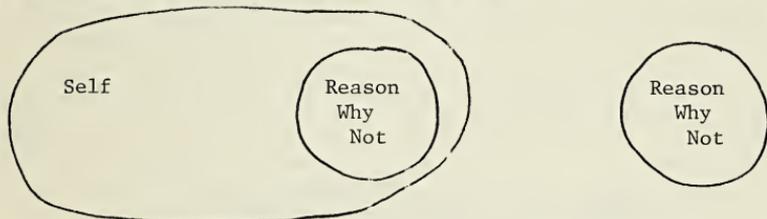
Some examples of Reasons Why Not, culled from the survey:

We're too small.  
We have nothing to offer.  
Local rules prohibit this.  
Language barrier.  
Can't afford it.

These are all excellent reasons. Now, one of two things will happen when someone, whom I shall call the Self, comes up against one of these reasons. The Self can let the Reason stop him:



Or the Self can realize that there is more to him than a reason why not to, can expand his sense of Selfhood, become bigger than his obstacle, include it (at which point it ceases to be a stumbling block and becomes a stepping stone), and go on to the next obstacle:



Notice that in this paradigm, or model, everytime you expand from overcoming a Reason Why Not, the next obstacle seems less insurmountable. And it is. So how do you "expand to include" obstacles? I don't know! You just do! We've all done it many times in our lives. Everytime our commitment to producing a result has been greater than whatever looked as if it would stop us, we've done it. Those times you thought you just couldn't go on, and somehow you did. The times you thought you'd have to give up something important because someone else had something more important that got in your way--and suddenly, there was a solution that worked for everybody. I know you know what I'm talking about. And if you can figure out the "how-to" of it, I encourage you to bottle and sell it--you'll make a fortune. And I'll be your first customer.

I tell you this: you are never alone in this. I am available to you, here at the conference and in the future to assist in any way I can. Use me. Enroll your colleagues at home. Get the highest level support you can muster from your administration; then try for the next level. Keep going. Get documentation of value from institutions that have exchange programs going (we are compiling an information packet that, we hope, will include such documentation).

Start your program, if possible, with an institution that is already participating in exchanges and you may halve the inertia you'll need to overcome. Brainstorm. I cannot tell you what a valuable tool this last is. If anyone doesn't know the mechanics of brainstorming and wants to find out, I'll be glad to go into it in more detail.

## TRAINING THROUGH STAFF EXCHANGE PROGRAMS, Continued

Give others permission to shine; that is, allow others to excel (this is a biggie for the ego to handle). We're going to have to get off the position that our zoo is the best, another second-best, and so on. We're going to have to let every zoo be the best, each in its own, special way. And we must start now.

Communicate. When you get stopped, get empowered. That's what brainstorming is about. And when you win, share your victory and get more empowered. Notice where you limit yourself and always go for more.

These are all helpful little household hints. They won't get the job done. What will is you--the person sitting in your chair. Ask yourself how willing you are to see these exchange programs get going. If you decide you can't do it, that it's a good idea BUT, that's fine. No problem. Probably no exchanges at your institution either.

So, how great are YOU willing to have to be?

Slight Addendum: Arriving at this conference, I learned that ABWAK, the Association of British Wild Animal Keepers, is sourcing exchanges in Europe. I have yet to investigate the extent of this, but here's an existing source into which we can plug. Also, AAZK President Pat Sammarco handed me a letter from the Science and Technology Exchange Program, inviting AAZK people to participate in 17-19 day exchange tours in China. I have yet to investigate the form that these would take, but the message is clear: China is also available to us.



### GOING, GOING, GONE: WILDLIFE PRODUCT SALE GENERATES A QUARTER-MILLION DOLLARS

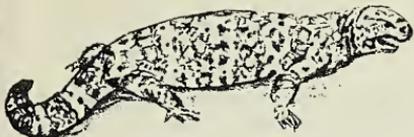
The sale of a 10-year backlog of confiscated wildlife products has generated an estimated \$250,000 in bids from people across the country, according to Clark R. Bavin, chief of the U.S. Fish and Wildlife Service's law enforcement division. Proceeds from the sale, less administrative costs, will be deposited in the U.S. Treasury.

Bavin said he was pleased to clear out the storage facilities and to be rid of the "paper nightmare" of caring for the products. They have been stored at government expense since their involvement in violations of various Federal and State wildlife conservation laws.

Bavin said 574 people placed about 28,000 bids in the largest sale of its kind of 350 lots of ivory, reptile leather products, fur coats, and assorted curios made from wildlife. Several people bid on the entire collection, while as many as 150 bid on many of the individual lots.

The highest bid, and also a tie bid broken by the flip of a coin, was \$14,753.30 for 94 fur coats sold as one lot. The second high bid was \$14,144 for 640 pieces of black coral jewelry. Other winning bids were \$909 for nine armadillo handbags; \$552.60 for 36 elephant hide beer mugs; \$1,928.88 for a 53.8 pound elephant tusk; \$180 for four stuffed caiman; \$200 for a stuffed coatimundi; \$500 for a large elephant foot stand; \$688 for four elephant foot ice buckets; \$220 for 44 hollow ostrich eggs; \$310 for 72 pairs of ladies python shoes and \$1,257 for a lion skin.

The Fish and Wildlife Service has a much greater volume of more restricted products which cannot be sold, such as endangered species, marine mammal, and migratory bird specimens and products. They are being made available as loans or donations to zoos, museums, universities, research institutions or government agencies for public display or educational purposes.



CLIMATE MODIFICATION IN THE HIGH DESERT:  
RIO GRANDE HERPETARIUM

By  
Dora M. Jacobs  
Sr. Herpetarium Keeper  
Rio Grande Zoo, Albuquerque, NM

Rio Grande Zoo, Albuquerque, New Mexico, is located in a river valley on the high plains. It's western boundary is the Bosque, the cottonwood grove planted by Spanish settlers in the 1500's, which lines the Rio Grande and its network of irrigation ditches, the "acequias". Some of these venerable cottonwoods still stand within the zoo grounds; others have had to be cut down as they progressively died off and dropped heavy limbs, squashing fences and winging visitors.

Despite its grandiose name, "El Rio Grande del Norte", --"The Great River of the North" -- formerly referring to North Mexico, the river itself at this point is often nothing but a huge sandbox in midsummer, with a few narrow channels carrying what remains of the water after the communities to the north tap it for irrigation and the blazing sun evaporates most of the rest.

New Mexico is distinctive in having six climatic zones: Lower Sonoran desert, Upper Sonoran plains, lumber or Transition Zone, water storage or Canadian Zone, high mountain Hudsonian Zone, and Arctic-Alpine Zone on the high peaks. Albuquerque is located in the Upper Sonoran Zone, spreading from the Rio Grande along the mesas to the east and west and into the foothills of the Sandia Mountains to the east. Situated on the west slope of Sandia Peak, it is approximately 1 mile above sea level, the mountain cresting at 10,000 feet, and the Maderia formation of limestone found at the summit continues 12,000-15,000 feet below Albuquerque. Albuquerque is built on top of the sand and gravel created along the fault which raised Sandia Crest in the last 10 million years or so. The Upper Sonoran Zone is distinguished by pinon and scrub juniper trees, sagebrush and grama grass.

Our climate at Rio Grande Zoo is characterized by dryness most of the year, occasionally relieved by heavy rains, which are likely to cause flash flooding since the ground is not absorbent. Humidity averages 8%, and average rainfall is 8.4" yearly. Our water supply comes from the fossil wells and the mountain watershed. We do occasionally get some snow during our winters. More often, we watch it snow on the mountain. Because of our high altitude and the nature of our soil, we experience considerable temperature variation between winter and summer, and day and night. Average temperatures are 24-46°F in winter, and 66-91°F in summer. Our largest obstacles to overcome with respect to keeping herpetofauna are temperature variation and low humidity.

Rio Grande Zoo began its history in the 1920's as a roadside exhibit. In 1957 it was closed to vehicular traffic and fences in 1958. Buildings were constructed in 1961 with an Elephant house. Alligators were kept in open ponds, and one was lost during a severe winter. A few snakes accumulated in wooden cages in the Keeper area of the Great Ape House were eventually exhibited in a hutch-like display in the Ape House Gallery during the late 1970's. Heating and cooling failures were common and sanitation was difficult. A 1975 bond issue made possible the construction of a Herpetarium, which has cost \$800,000 to date. Opening

CLIMATE MODIFICATION IN THE HIGH DESERT: RIO GRANDE HERPETARIUM  
(Continued)

was officially in the summer of 1979, although animals were moved in and kept off-exhibit many months earlier. The building is not yet completed. Finish work has progressed as money became available. We now house 407 individual reptiles and amphibians of 113 species.

The Herpetarium is cement block construction in a squared U-shape, with potential for enclosing the inner courtyard. It is partially bermed for passive insulation and heavily insulated on the exterior walls. Lighting is entirely artificial throughout the building, except for the unfinished wing, which has skylights. The heating and cooling systems allow for individual rooms and exhibits to be maintained by widely differing temperature ranges. Photoperiod is governed by electric timers, allowing for different cycles even for exhibits in the same room. Humidity is controlled in individual rooms and exhibits by various means including running water, pools, misting, and the presence of live plants.

Inside, the Herpetarium is arranged in the form of an open, double U-shape, with the public gallery on the inside, completely separated from the service area. The public viewing area is further partially subdivided into five horseshow-chaped bays and one underdeveloped large exhibit room along the north leg of the U.

The work area is subdivided into a service room for each exhibit peninsula, a connecting hallway, and several separate rooms: a kitchen, the curator's office, and rooms which may be used for quarantine, reserve animals, breeding, storage, raising food animals, or exhibit construction. A walk-in cooler has recently been installed to be outfitted as a hibernaculum.

All of the separate interior areas are provided with individual heating and cooling systems so they may be kept at different temperatures for different purposes. The building is heavily insulated, and the only natural lighting is skylights in the large exhibit area, which is as yet unfinished. Light cycles can also be controlled in the exhibit rooms by means of timers which control the module or room lights. We have two separate photoperiod cycles for Northern and Southern hemisphere animals, with changes made manually every two weeks during the year. Some rooms have a Southern Hemisphere cycle on one side and a Northern Hemisphere cycle on the other. Our room exhibits allow for much more extensive lighting than we can use in the modules and aquarium-terrariums.

We use both incandescent and fluorescent lighting, specifically incandescent sunlamps, white heat lamps, Duo-Test Vita Lite, GE black bulb light (BL designation), Duo-Test Day Lite 65, in various combinations to provide full-spectrum lighting plus hot spots were needed. In the modules and room exhibits, there is also a second stage of lighting during the middle of the day for additional illumination and heat to stimulate midday.

Some cooling, or at least heat-moderation, is provided by pools and running water. Humidity is also raised in this manner. Exhibits where high humidity is desirable are misted in the morning or evening and then allowed to dry out. Since misting was instituted in the Schlotpusik exhibit, shedding has greatly improved. Additional humidity is achieved in some modules or tanks by pouring water on the substrate.

CLIMATE MODIFICATION IN THE HIGH DESERT: RIO GRANDE HERPETARIUM  
(Continued)

Temperature gradients are provided in some of the large exhibits by various combinations of heat lamps, sub-floor heaters, pools, waterfalls, caves, multilevel terracing, varied substrates, and natural plants.

One interesting modification is the addition of oxygen to the atmosphere of incubating eggs. Since our mile-high oxygen pressure may be a little low for the developing embryos of sea-level species, we maintain all our eggs in sealed Zip-lock bags, adding fresh oxygen every few days.

Rio Grande Herpetarium uses three types of exhibits to date: landscaped rooms, fiberglass modules, and smaller aquaria and terraria.

The individual exhibit workrooms are sealed off and separate from the Public Gallery and the service corridor. Each can be maintained at its own temperature range as narrow as 6°F. At present, the Africa-Europe room is the warmest, at 84°F, and the coolest is the South American cloudforest room at 73-75°F.

Interspersed between the main exhibit workrooms are smaller rooms which are finished as exhibits in themselves, with windows to the Public Gallery. Rock masonry or gunite sculpture and live plants provide a naturalistic setting, and the entire ceiling area is devoted to lighting. Temperature is controlled by individual cooling-heating units, assorted lamps, pools, some with circulating water, crevices, dens, and varied substrates. Light cycles are governed by automatic timers according to Northern or Southern Hemisphere schedules. Humidity control is provided by real plants, daily misting, watering of the substrate, running waterfalls, and pools.

Fiberglass modules, smaller than the room exhibits, are large enough to accommodate fair-sized reptiles and artifacts. Temperature is moderated by prevailing room temperature, module lighting, occasional module floor heaters, and in the future, we hope, running water. Photoperiod is controlled by a master timer on the room wall. Some rooms have a Southern Hemisphere cycle on one side and Northern on the other. Humidity is regulated by live plants, daily watering of the substrate, and a potential for running water.

A third type of exhibit at Rio Grande Herpetarium is the cluster of aquaria and terraria, each with its own viewing window and tank-top light. Temperature control for these, besides prevailing room temperature, is by aquarium lights, running water, and a potential for hot rocks. Light cycles cannot be governed by wall timers for the tanks; it is entirely dependent upon the keeper turning room and aquarium lights on and off. Humidity is again determined by daily misting, watering of substrate, and running water.

Our plans for the future call for an outdoor African Tortoise exhibit, the development of our large skylighted room, probably for crocodilians, a hibernaculum, and incubation room. We already have a walk-in cooler shell to be outfitted as a hibernaculum. In addition, outdoor exhibits are proposed for American Alligators and San Esteban Island Chuckwallas.

In summary, climate modification in the Upper Sonoran Zone, of which Albuquerque, New Mexico is a part, consists of mitigating day and nighttime, summer and winter temperatures and creating artificial light cycles to simulate Northern and Southern Hemisphere photoperiods.



## NORTHERN HEMISPHERE

Date	Photoperiod Phase I	Time On	Time Off
Jan 1	10 hr.	7:30 a.m.	5:30 p.m.
Jan 15	10.5 hr	7:15 a.m.	5:45 p.m.
Feb 1	11 hr.	7:00 a.m.	6:00 p.m.
Feb. 15	11.5 hr.	6:45 a.m.	6:15 p.m.
Mar 1	12 hr.	6:30 a.m.	6:30 p.m.
Mar 15	12.5 hr.	6:15 a.m.	6:45 p.m.
Apr 1	13 hr.	6:00 a.m.	7:00 p.m.
Apr 15	13.5 hr	5:45 a.m.	7:15 p.m.
May 1	14 hr.	5:30 a.m.	7:30 p.m.
May 15	14.5 hr.	5:15 a.m.	7:45 p.m.
Jun 1	15 hr.	5:00 a.m.	8:00 p.m.
Jun 15	16 hr	4:45 a.m.	8:45 p.m.
Jul 1	15 hr.	5:00 a.m.	8:00 p.m.
Jul 15	14.5 hr.	5:15 a.m.	7:45 p.m.
Aug 1	14 hr	5:30 a.m.	7:30 p.m.
Aug 15	13.5 hr.	5:45 a.m.	7:15 p.m.
Sep 1	13 hr	6:00 a.m.	7:00 p.m.
Sep 15	12.5 hr.	6:15 a.m.	6:45 p.m.
Oct 1	12 hr.	6:30 a.m.	6:30 p.m.
Oct 15	11.5 hr.	6:45 a.m.	6:15 p.m.
Nov 1	11 hr.	7:00 a.m.	6:00 p.m.
Nov 15	10.5 hr	7:15 a.m.	5:45 p.m.
Dec 1	10 hr.	7:30 a.m.	5:30 p.m.
Dec 15	9.5 hr	7:45 a.m.	5:15 p.m.



## SOUTHERN HEMISPHERE

Date	Photoperiod Phase I	Time On	Time Off
Jan 1	15 hr.	5:00 a.m	8:00 p.m.
Jan 15	14.5 hr.	5:15 a.m.	7:45 p.m.
Feb 1	14 hr	5:30 a.m.	7:30 p.m.
Feb. 15	13.5 hr.	5:45 a.m.	7:15 p.m.
Mar 1	13 hr.	6:00 a.m.	7:00 p.m.
Mar 15	12.5 hr.	6:15 a.m.	6:45 p.m.
Apr 1	12 hr.	6:30 a.m.	6:30 p.m.
Apr. 15	11.5 hr.	6:45 a.m.	6:15 p.m.
May 1	11 hr.	7:00 a.m.	6:00 p.m.
May 15	10.5 hr.	7:15 a.m.	5:45 p.m.
Jun 1	10 hr.	7:30 a.m.	5:30 p.m.
Jun 15	9.5 hr.	7:45 a.m.	5:15 p.m.
Jul 1	10 hr	7:30 a.m.	5:30 p.m.
Jul 15	10.5 hr.	7:15 a.m.	5:45 p.m.
Aug 1	11 hr.	7:00 a.m.	6:00 p.m.
Aug 15	11.5 hr	6:45 a.m.	6:15 p.m.
Sep 1	12 hr	6:30 a.m.	6:30 p.m.
Sep 15	12.5 hr	6:15 a.m.	6:45 p.m.
Oct 1	13 hr.	6:00 a.m.	7:00 p.m.
Oct 15	13.5 hr.	5:45 a.m.	7:15 p.m.
Nov 1	14 hr.	5:30 a.m.	7:30 p.m.
Nov 15	14.5 hr.	5:15 a.m.	7:45 p.m.
Dec 1	15 hr	5:00 a.m.	8:00 p.m.
Dec 15	16 hr.	4:45 a.m.	8:45 p.m.

CLIMATE MODIFICATION IN THE HIGH DESERT: RIO GRANDE HERPETARIUM  
(Continued)

REPTILE CAPTIVE REPRODUCTION  
RIO GRANDE ZOO

SPECIES	1980	1981	1982
Western Diamondback Rattlesnake <i>Crotalus atrox</i>	X		
Leopard Gecko <i>Eublepharis macularius</i>	X	X	X
Stinkpot Turtle <i>Sternotherus odoratus</i>	X		
Timor Monitor <i>Varanus timorensis</i>	X		
Mediterranean Gecko <i>Hemidactylus t. turcicus</i>	X	X	
Corn Snake <i>Elaphe g. guttata</i>		X	X
Mangrove Snake <i>Bogia dendrophila</i> ssp.		X	
Malay Pit Viper <i>Calloselasma rhodostoma</i>		X	
West African Gaboon Viper <i>Bitis gabonica rhinoceros</i>		X	X
Snapping Turtle <i>Chelydra serpentina</i>		X	
Cantil <i>Agkistrodon b. bilineatus</i>			X



CREDITS

I wish to thank Herpetarium Curator Dale Belcher for his assistance and advice in technical matters. I also wish to thank my fellow Sr. Herpetarium Keepers, Viveca Ornelas, Glenn Riordan, and Candace Kroft for their support in this undertaking. In addition, Albuquerque Public Library, Dr. Lee Woodward of the University of New Mexico Department of Geology, Albuquerque Color Lab, and Berta Wilson contributed to the presentation of this paper at the Toronto AAZK National Conference, 1982.

Climates of the World: US Department of Commerce, Environmental Science Services Administration, Environmental Data Service, 1972.

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WOODLAND PARK ZOOLOGICAL GARDENS'  
EAGLE RELEASE PROGRAM 1982

By  
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Woodland Park Zoological Gardens  
Seattle, Washington

BACKGROUND

The state of Washington has resident breeding populations of both bald and golden eagles, and is a major bald eagle wintering ground. The bald eagle is listed as endangered in most of its range and threatened in the remainder. Each year, several injured or dibilitated eagles are turned in to state and federal wildlife officials. The prime causes of injury are either gunshot wounds, or general weakness in young and inexperienced birds unable to forage successfully.

In the early 1970's, due to the interest in birds of prey and expertise of zoo personnel, an agreement was reached with state and federal wild-life officials wherein the Woodland Park Zoological Gardens became the repository and primary care facility for these injured eagles. From these beginnings Woodland Park Zoological Gardens developed an eagle rehabilitation program called "Project Eagle Release". During the past decade, Woodland Park Zoological Gardens has successfully returned 30 bald and golden eagles to the wild.

When the birds arrive, they are placed in the zoo's animal health care facility for examination and treatment. The birds are then quarantined at the Infirmary for 14 days. During that time, and in the weeks to follow, the birds are evaluated for possible rehabilitation and release. Those that cannot be released are placed in various captive breeding and public education programs. The use of non-releasable birds for public education has been a fundamental part of "Project Eagle Release". It is hoped that by educating the public about the role of birds of prey in the ecosystem, an understanding and appreciation of these birds will be generated. Eagles that recover sufficiently are released to the wild.

In the winter of 1981 those involved with the release program included the staff veterinarian, the Curator of Birds, the Senior Keeper of Birds and four keepers. At the suggestion of the Curator of Birds, this group began in committee fashion to prepare a grant proposal. It was hoped to obtain funding that would allow for six to eight weeks of field monitoring via radio telemetry of the released eagles.

The proposal was submitted to Earthwatch Expeditions. Earthwatch is a non-profit organization that serves as a clearing house to bring together researchers and interested volunteers. The volunteers provide personnel for the research project, and they pay a fee that provides funding for the project.

The grant proposal was accepted and Earthwatch began gathering volunteers to fill four positions on each of four teams. Each team would spend four-

## WOODLAND PARK ZOOLOGICAL GARDENS' EAGLE RELEASE PROGRAM 1982, Continued

teen days on the project which ran from 4 January to 1 March 1982. Dr. James Foster, DVM, and Walter English, Curator of Birds, acted as co-principal investigators. Each team was headed by a keeper acting as field biologist.

The first day of each team was spent at Woodland Park Zoological Gardens going through an orientation and observing the final preparations made for the particular eagles they would be monitoring. These preparations included the final physical exam, replacement of damaged flight feathers, if necessary, weighing, attachment of USFWS leg band and color marker, and mounting of the radio transmitter on the eagle.

Telemetry equipment used were Telonics receiver model TR-1-20, and tail mount Telonics transmitter model RB-5. An omni-directional car mount antenna was used in conjunction with a uni-directional hand-held antenna.

The second day began with a very early departure to the release site, San Juan Island, in the northern part of Puget Sound. Once at San Juan Island the eagles were released and work was begun. The release is always an event that receives much media coverage.

San Juan Island was chosen for the release site for two primary reasons. (1) It has an extremely abundant food source in the form of European rabbits which were introduced on the island in the late nineteenth century. Such an abundant food source allows the released eagle to regain its flight capabilities before having to compete strenuously for food. (2) In addition to a resident nesting population, San Juan Island is an annual wintering area for bald eagles. The presence of these wintering birds facilitates the finding of food and roost areas by the released eagles.

The months of January and February are used for release as there is no defense of territory by the resident nesting population. If this release period were not used, there would be a high probability of increased stress on the released eagles and a disruption of nesting activities of the resident population.

After the eagles were released, the volunteers began immediate "on the job training" under the supervision of the field biologists. Training included the use of radio telemetry equipment, use of compass and maps in the triangulation of a radio-tagged eagle's location, identification of eagles (golden eagles are also present on the island) and their age class, and the use of the continuous scam sample data collection technique. This training quickly became the daily duties of the entire team for the remainder of their session.

### RESEARCH OBJECTIVES

The primary objective of this project was to determine the success of released, rehabilitated eagles in the wild. By success we mean that the eagle is not only alive, but socially integrated into the wild population and capable of viable offspring. A variety of criteria was used to achieve this broad-based evaluation. Data on all criteria was collected from both the existing wild population and from released birds. Observations were concentrated on the areas listed below.

Flight ability: Each released bird was closely monitored to assure that its ability to fly was sufficient to obtain food, find shelter and migrate from the island in the spring.

Foraging success: Birds were monitored to determine whether they were obtaining sufficient food for survival. In addition, data was collected on the percentage of live food and carrion taken, whether the bird was victim or perpetrator of piracy, displacement of others from food, and feeding areas used.

Food preference: Salmon and rabbits are the preferred food items, but both are subject to large fluctuations in population size. Artificial feeding might become necessary not only for the rehabilitated eagles, but for the wild eagles as well. Data was collected on food preference for naturally occurring prey species as well as some novel food items.

Social interaction: Assimilation of rehabilitated eagles into the wild population was evaluated by monitoring social interaction related to food, roost sites, ability to obtain and retain preferred perches, and occurrence of any courtship or pair bonding behavior. Because there are known nest sites within the study area, pair bonding behavior of wild eagles in the winter was also monitored.

Migration: With the use of radio telemetry equipment, data on time of migration and destination of migrating birds was obtained when possible.

Census: A weekly census of the eagle population was taken. An evaluation of the technique of counting eagles at night roost areas as a census method was made by comparing results to those obtained by road census.

Habituation: A comparison of rehabilitated eagles and wild eagles was made to determine whether captivity had altered the flight distance of rehabilitated birds.

## RESULTS

Between 5 January and 17 February, 1982, three golden eagles and four bald eagles were released on San Juan Island, Washington. Of these seven birds, three remained on the island throughout the field study. Two flew off the island out of radio contact, and two had to be returned to Woodland Park Zoological Gardens for further rehabilitation.

An immature female golden eagle and two immature male bald eagles remained on the island and were periodically located (by visual sighting or radio signal) to determine the success of their release. All three of these birds moved about the island, eventually winding up in the San Juan Valley where many eagles tend to congregate for feeding. Judging from their flight capability and their ability to defend food and interact with other raptors, we were confident that these birds would be successful survivors.

One immature bald eagle, upon release, immediately flew off the island. Aerial surveys were made in an attempt to pick up her radio signal, but with no success. We can be sure of her flight capability and that was one of our more important criteria for determining a bird's successful release. It is unfortunate, however, that we were unable to make any observations on her interactions with other eagles and feeding behavior. Another bird, an immature male golden eagle, was followed for a week on the island before he flew to a neighboring island (located by radio signal). A few days later, he returned to San Juan Island and was located by telemetry and visual sighting. Although we were unable to locate him after that, we are optimistic about his survival judging from his strong flight capability.

## WOODLAND PARK ZOOLOGICAL GARDENS' EAGLE RELEASE PROGRAM 1982, Continued

The two birds that had to be returned to Woodland Park Zoological Gardens for further rehabilitation were an adult female golden and an immature female bald eagle. It is thought that a combination of poor weather and too high a condition contributed to the failure of these birds to hunt following their release. With cold and rainy weather, eagles were less active, primarily because prey was less active. Compounding the problem is the fact that these birds were overweight and could weather out the rain and cold in sheltered forests, living on their fat reserves. We were therefore unable to judge the two major criteria that we used to determine a successful release. After these birds spent about two weeks, inactive, in heavily forested woodlots, it was decided that it would be best to recapture them and release them at a later date, under more optimal conditions.

Food preference tests: Time constraints and methodology made results of these tests disappointing. Some noteworthy observations were made, however; for example that the bald eagles preferred rabbit over fish. Interaction of immature birds with adults at feeding areas proved to be of interest.

Behavioral scan samples: Quantifiable data were collected on activity patterns of wild and released birds. An attempt will be made to correlate this data with age and a comparison will be made between wild and rehabilitated birds.

Migration information: These data will be collected on an opportunistic basis. It will largely result from reports of other investigators in Alaska and British Columbia who get visual sighting of our released birds or pick up their signals on their telemetry receivers. The frequencies of our transmitters have been sent to these investigators requesting cooperation.

Road and night roost census: These data proved to be of interest and should provide information regarding wintering populations and migration. Also, there is some indication that the roost sites may be of important social significance. Additionally, a previously undocumented roost was located.

Flight distance tests: Data collected during these tests will be difficult to evaluate since unexpected variables such as weather, topography and much individual variation between birds tended to confound the results.

### SUMMARY

It would seem proper to emphasize here the results and achievements of the above work. However, for this audience, I feel it is more appropriate to emphasize the indispensable role played by zookeepers in the planning and execution of this field project.



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## BORN PROTECTED

As of May 1982, all species of game in Norway, as well as eggs, nests, lairs and sets, are protected unless the law says otherwise.

---Animal Welfare Institute Quarterly

DOMINANCE AND SOCIAL DYNAMICS OF A GROUP  
OF CAPTIVE CAPYBARAS (*Hydrochoerus hydrochaeris*)

By  
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Senior Keeper - Grasslands  
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ABSTRACT

This study reports on the social dynamics and dominance system of a group of capybaras ranging in number from 8 to 15 animals of varying ages and relationships.

Observations were made when interactions were at their peak--morning, evening and during feeding. Additional observations were made at random intervals throughout the day. Also recorded were vigilance by group members, interanimal distances and their correlation with the care of newborn pups.

Results indicate a very strong dominance system in this particular polygamous group. One male appeared to be the only breeder although several mature males were present. Dominance was strongly linear within and between sexes and was highly evident during feeding periods; dominant animals had first preference to food and easily displaced subordinate animals as measured on a six level aggression scale. Newborn pups were accorded protection under their mother's social status, which increased following birth. Pre-parturitive females descended in dominance following birth of another female's litter, but attained their former rank upon parturition. Changes in male and nonpregnant female status occurred rarely and over a slow period.

Many of the observations and the results obtained agree with those of a study of wild groups of capybaras in South America.

Suggestions are made for management and the exhibition of large groups of capybaras in zoos based on parameters of social spacing obtained here.

INTRODUCTION

The capybara (*Hydrochoerus hydrochaeris*) have been the subject of several extensive field studies (Ojasti, 1968,1973; MacDonald, 1981; Schaller and Crawshaw, 1981) as well as some zoo studies (Zara, 1973; Donaldson et al, 1975). Ojasti (1973) provides a broad overview of this rodent's behavior while Schaller and Crawshaw (1981) and MacDonald (1981) determined parameters governing social organization in the wild. Zoo studies are difficult unless sufficient space is available to a growing population, and although Donaldson et al (1975) attempted to detail various aspects of captive capybara behavior, their effort fell short and even reached invalid conclusions based on that zoo's need for winter housing of their group. In addition, the group, while in a semi-natural habitat for six months of the year, was too small to viably make any reasonable statements about social behavior of the capybaras.

The Audubon Park Zoo is a climatically favorable site for year-round exhibition of capybaras. The nature of the exhibit allows for optimal conditions for maintaining and studying a captive group of capybaras.

This study sought to determine the parameters for exhibiting and managing

DOMINANCE AND SOCIAL DYNAMICS IN A CAPTIVE GROUP OF CAPYBARAS, Continued

capibaras in a zoo by examining dominance through aggressive interactions, so that natural behavior was displayed by the animals. Other aspects of behavior in a semi-natural habitat were also the subject of investigation.

METHODS

A group of capybaras ranging in number from 8 to 15 were observed for four months. The capybaras have been exhibited in an 1.5 acre enclosure for 2½ years. The exhibit measures 600 feet in length, 100 feet in width and is divided in half lengthwise by a lagoon which slopes to a depth of 12 feet. The topography of the land consists of elderberry bushes, Chinese tallow trees, a long six foot high ridge, and cypress, magnolia, crepe myrtle, willow, hackberry and live oak trees.

Also displayed in the exhibit are South American tapirs (*Tapirus terrestris*), guanaco (*Lama glama guanicoe*) common rhea (*Rhea americana*) and assorted waterfowl.

The capybaras are kept on exhibit for 24-hours-a-day all year long. They are fed twice daily. In the morning their diet consists of alfalfa hay, lettuce and apples and in the evening they are given the same produce with the addition of monkey chow biscuits. Evening feed is distributed in a creep feeder to prevent the other species from stealing food.

Most of the capybaras are related through the dominant male or common parentage (See Figure 1). Animals ranged in age from newborn to 7 years over the course of the observations.

Figure 1

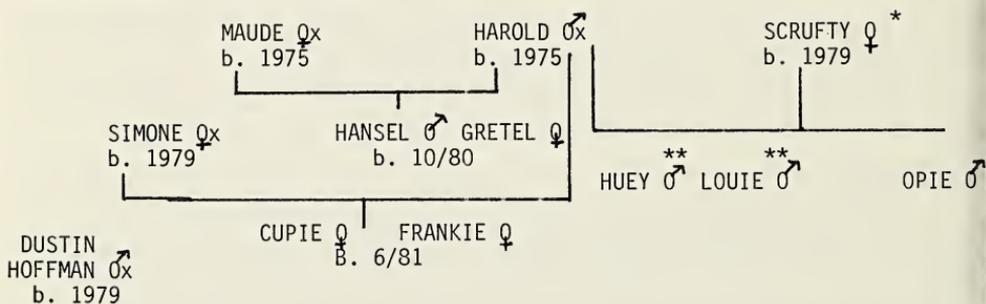


Figure 1 - Family tree of capybaras at Audubon Park Zoo, showing approximate birthdates, relationships and parentage.

- b. - born
- x - same parents
- \* - unrelated to group
- \*\* - removed from exhibit at 1 week, reintroduced at three months.

Observations were made ad lib at peak activity periods: during morning and evening feeding; and at random periods.

Dominance and social interaction was measured by using a six level aggression scale. Since maximum aggressive interactions seemed to occur during feeding due to food competition and priority to preferred foods by dominant animals, most observations were made at feeding times. Hence degree of aggression served as a measure of dominance.

Levels of aggression were ranked in the following way:

- Level 1: Simple displacement - A approaches B, B moves away
- Level 2: Land Approach - A approaches B, chases B less than 25 feet
- Level 3: Land Pursuit - A Chases B on land distance greater than 25ft.
- Level 4: Land-Water Pursuit - A Chases B into Water but A does not enter water. A may watch B from shore or return to feeding site.
- Level 5: Escalated Land-Water Pursuit - A chases B into water and continues chasing in water by swimming after B.
- Level 6: Intense Land-Water Pursuit - A chases B into water, swims after B. A continuous pursuit on land if B leaves water.

These measures were adopted because various physical boundaries appeared to halt continuation of a chase. Twenty-five feet was the distance that, if surpassed, constituted a longer chase, temporally. The shoreline appeared to act as a barrier between level 4 and level 5 aggression. The chase either stopped at the water's edge or continued through swimming.

In addition, observations were made on vigilance by group members, individuals occupying the core of the herd along with peripheral animals, and their distances from the core. Distances were measured by using adult body length as a rule.

Vigilance was defined as a sitting or lying animal whose head was pointed in the direction of a vanquished subordinate, or non-core member.

## RESULTS

The most frequent levels of aggression measured by the number of aggressive bouts was the least intense levels 1, 2 and 3, respectively (Table 1, Figure 2). Females were more frequently aggressive toward other females and males (Figure 2 and Figure 3) although the most intense aggression usually occurred only between males (Figure 3).

An examination of group number and aggression showed that more male-male aggression occurred when more males were present, earlier in the study.

Intersexual aggression was as likely to occur with either sex being the victim (See Figure 2 and Figure 4).

The most subordinate animals in each sex (2 males, 1 female) were the subject of most male initiated attacks and half of all female initiated attacks (Table 1, Figure 4). As intensity of aggression (level of aggression) increased, subordinate males had a greater chance of being attacked (Figure 5).

Aggression seemed fairly consistent among females throughout the course of the study but was more sporadic for males (Figure 6A)

TABLE 1  
BOUNDS OF AGGRESSION

Aggressor-victim pairs/ attacks on subordinate of victim/sex

LEVEL OF AGGRESSION	♂-♂	♀-♀	♀-♂	♂-♀	TOTAL
1	1	19/1	11/4	8/4	39/46
2	3/3	9/5	7/6	4/4	23/99
3	3/3	8/8	2/2	3/2	16/510
4	1/1	5/5		1/1	7/16
5	2/2	4/2			6/22
6	1/1				1/1
TOTAL	11/10	45/22	20/12	16/11	

Table 1--Total bouts of aggression for each level of aggression for four aggressor-victim pairs. Row totals express total bouts of that level over bouts directed at subordinate males (in circle) and female (in square). Column totals express total bouts for that aggressor-victim pair over bouts directed at subordinate males (in circle) or female (in square).

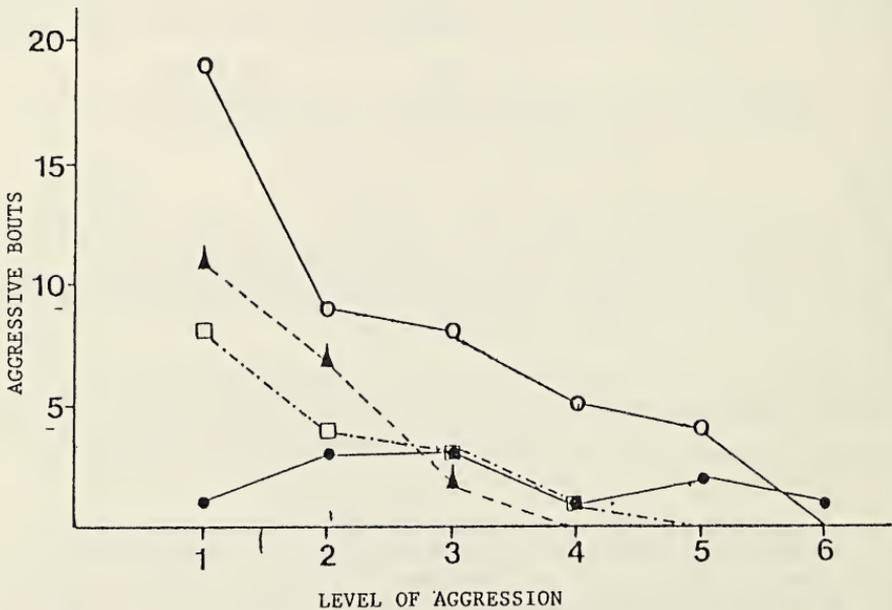


Figure 2 - Total number of aggressive bouts at each level of aggression for aggressor-victim pairs

♂-♂ (●-●), ♀-♀ (○-○), ♀-♂ (▲-▲), and ♂-♀ (□-□).

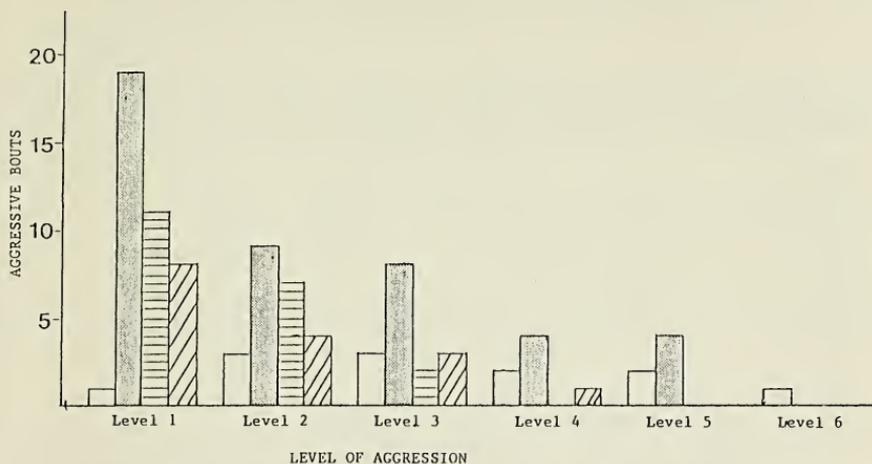


Figure 3 - Total number of aggressive bouts of each level of aggression for aggressor-victim pairs ♂-♂ , ♀-♀ , ♀-♂ , and ♂-♀

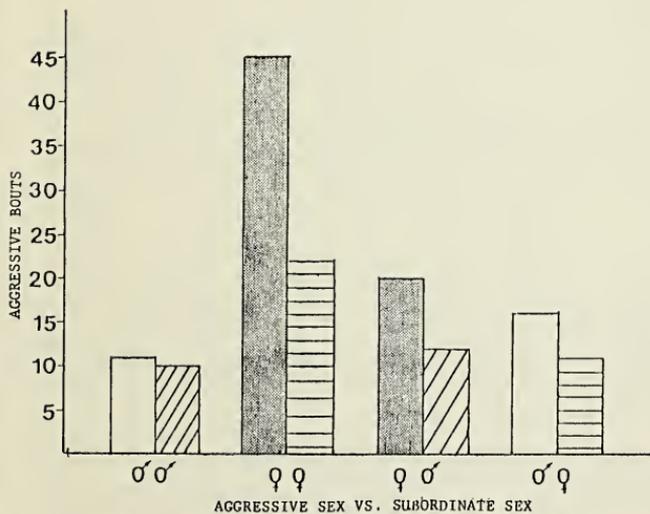


Figure 4 - Total number of aggressive bouts by males and females toward all animals (first bar) and subordinate males and female (second bar)

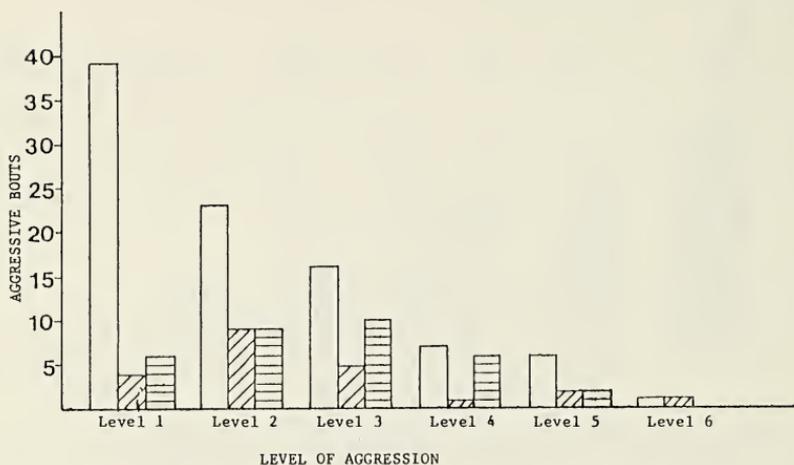


Figure 5 - Total number of aggressive bouts for all animals  $\square$  for each level of aggression compared to total aggressive bouts directed by all animals at subordinate males  $\text{▨}$  and females  $\text{▩}$

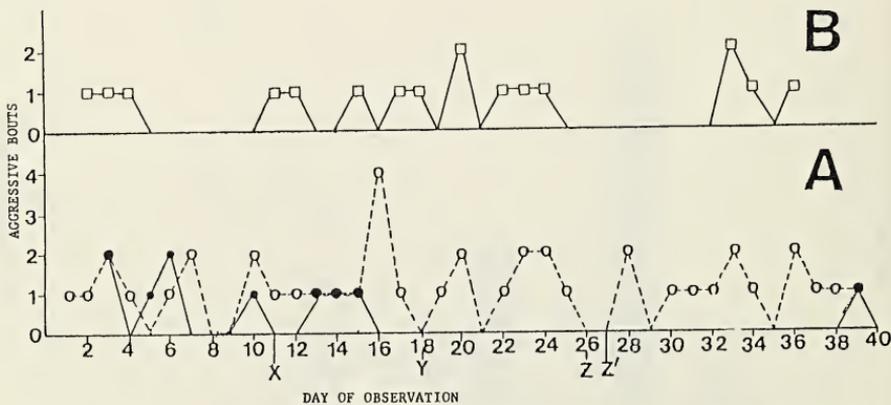


Figure 6 - A. Total number of aggressive bouts observed on each day of study for all male-male (●—●) and female-female (○---○) encounters.

B. Total number of aggressive bouts observed on each day of study for female-female encounters (□—□) with attacks on subordinate female removed.

X - 2.2 animals removed from exhibit  
 Y - 1 subordinate male died  
 Z, Z' - 2 dates on which litters were born

## DOMINANCE AND SOCIAL DYNAMICS OF A GROUP OF CAPTIVE CAPYBARAS, Continued

Table 2 shows the total number of times an animal was the victim of an attack. The animals are listed hierarchically based on these numbers. Figure 7 graphically illustrates dominance relationships among the group of capybaras.

In certain cases an animal that had more attacks against it ranks higher than an animal with fewer attacks. This is because in encounters between these two, the animal with greater total attacks on it initiated and won those bouts against the lower ranked animal.

Age was also a factor. Scruffy was attacked 11 times, most of them by Maude, who was older. Simone in contrast, was attacked only once, but she was younger than Scruffy.

Only one animal, Louie, was observed on a regular basis to serve as sentinel or guard over the core group. In most cases he was no less than 10 body lengths from the herd while guarding.

In general, however, core members occupied the center of the hay pile during morning feeding while less dominant animals remained in the peripheral region of 10 to 25 body lengths and fed when the core group had finished.

### DISCUSSION

This fluctuating group of capybaras was primarily a single family. Except for one female who was totally unrelated, all animals were related through

TABLE 2  
LEVEL OF AGGRESSION

<u>ANIMAL</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>TOTAL</u>
Harold	0	0	0	0	0	0	0
Hansel	0	0	0	0	0	0	0
Maude	2	0	0	0	0	0	2
Simone	0	1	0	0	0	0	1
Scruffy	8	3	0	0	0	0	11
Frankie	2	0	0	0	0	0	2
Opie	2	0	0	0	0	0	2
Cupie	5	0	0	0	0	0	5
Louie	4	1	0	0	0	0	5
Dustin Hoffman	3	6	2	0	0	1	12
Huey	1	3	3	1	2	0	10
Grete1	10	9	10	5	4	0	38

Table 2 - Linear hierarchy based on total number of aggressive bouts broken down into each level and indicating which animal was subject of attack. An animal with a greater attack total may rank higher than one with fewer attacks because the former attacked the latter a greater number of times.

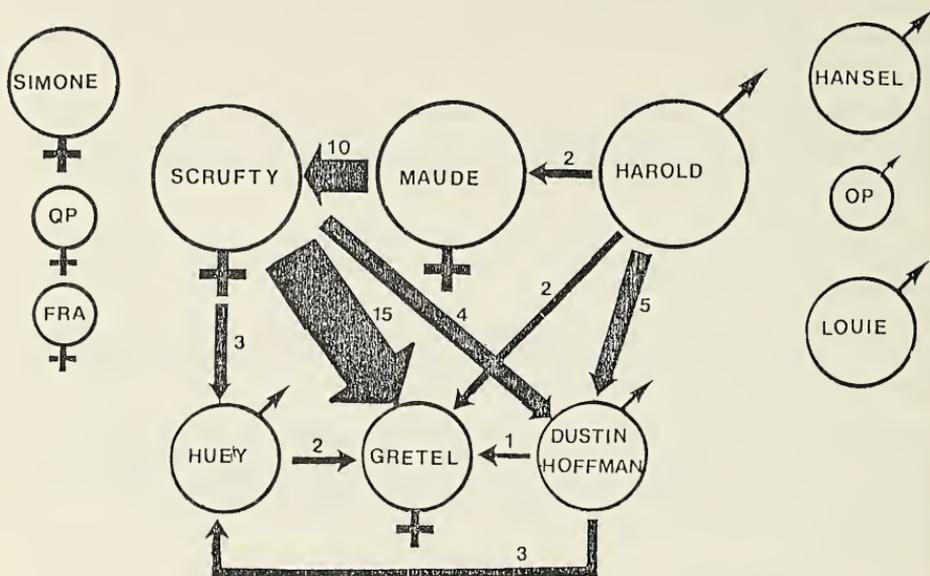


Figure 7 - Sociogram depicting dominance relationships among captive group of capybaras. All animals except for bottom three are considered to be part of the core group. Large circles are adults older than two years, medium size circles are two year old adults and small circles are yearlings. Thickness of arrow coincides with number of attacks (adjacent to arrow), directed at victim. Males on left side are ranked hierarchically. Females are ranked according to age.

common parentage. Ojasti (1973) termed the capybara herd as a "closed" hierarchical society. The semi-natural habitat established at Audubon Zoo seemed to permit naturally occurring behavior and was a closed system in that the zoo personnel had control over the population. It appears, however, that certain natural behaviors were found in our herd relating to changes in population structure.

The major significant difference between the field studies and our study was the amount of female-female aggression. This occurred more frequently than any other aggression and is contrary to Schaller and Crawshaw's findings (1981). Ojasti (1973) found that most "social intolerance" occurred between males. Similarly, Macdonald (1981) and Schaller and Crawshaw (1981) described a greater frequency of male aggression which became greater with an increase in males. Much of their observed aggression manifested itself in non-contact forms--chasing and general harrassing, although wounds were found among individuals. Our results indicate similar trends in terms of frequency of low intensity fighting. It is entirely possible that our lack of frequent male-male encounters was a result of the obvious size of the dominant male. This is also suggested as a means of dominance recognition by Donaldson et al (1975) and Schaller and Crawshaw (1981). Also, our population had a proportionately greater number of females who were closer in size, in particular the two who appeared to fight the most (Scruffy and Gretel).

The simple displacement so prevalent in this study was similarly described by Macdonald (1981). Escalated fighting was rare and escape strategies were often elaborate.

Although Donaldson et al's (1975) study involved only a trio of animals she still noted the "viciously enforced social hierarchy" of that capybara herd.

A definite linear hierarchy was found in our population. Schaller and Crawshaw (1981) likewise observed strong linear hierarchies among males. What is interesting is how two siblings from the same litter occupied such different positions and demonstrated such a high disparity in frequency of attack. Hansel, Gretel's brother, was never observed to be chased and he occupied a position close to the dominant male, Harold. His sister, however, suffered multiple cuts, scrapes and was continually chased during the start of feeding. It is possible that a selective force was operating to prevent her from bearing young by her father. Capybara have been noted to have a 50% mortality rate (Donaldson et al, 1975; Ojasti, 1973; Shaller and Crawshaw, 1981) and such a preventative device might be advantageous.

The majority of data was collected when N=8, Gretel, the lowest ranking animal would often feed in the morning and evening with Huey, the lowest ranking male. Gretel always appeared apprehensive as Huey approached and deferred to him until he assumed a feeding position.

Macdonald (1981) described promiscuous suckling of young in his study. Our captive group of capybaras demonstrated similar behavior between nursing females, the young moving from female to female. Similarly, babysitting by non-mature females was also observed more often than was male babysitting. That is, while males could serve to guard the litters, the females were more frequently observed watching the pups. Again, the issue of lineage may affect the degree of care. Macdonald (1981) suggested a link between degree of relatedness and indiscriminate care by group members.

Since our animals are so closely related, a good reason exists for any group members watching over the young. When the litters were first born, however, and brought to the rest of the group (females leave the group to give birth), aggression between females, excluding the subordinate female, appears to increase (Figure 6B). Increase in female-female aggression was also observed at two other periods of social disruption (Figure 6B). Again field studies describe similar increases in aggression following increases in group population (Ojasti, 1973; Macdonald, 1981; Shaller and Crawshaw, 1981).

Vigilance was only casually observed but results seem to concur with results of wild animals. Macdonald (1981) reports that only a few animals are asleep at a given time and that the group as a whole is always vigilant. Our observations indicate that less dominant animals served as sentinels keeping vigil over the group- Louie, a littermate of Huey and the same age as Hansel and Gretel was usually no less than 10 body lengths from the core group. He would chase off non-core animals and keep a watch over the shoreline, or a general perimeter around the core of approximately 25 body lengths. Similarly, Simone and several other animals served in this capacity but it was not on a regular basis as was Louie's guard duty. It is interesting to note that Louie was removed from the exhibit with his littermates at one week of age and reintroduced at three months. Although he was smaller in size than similarly aged capybaras, he was more a member of the group than was Huey or Gretel.

Sentinels may attain a higher rank through this guard duty but this is purely speculation. Vigilance is not unique among animals having been

described elsewhere (Rasa, 1977; Bertram, 1980) and should be investigated more thoroughly in capybaras.

Following the death of one of the subordinate males, Dustin Hoffman, Huey acquired his rank. Prior to this he was subordinate to Gretel. After a few aggressive bouts with Gretel, however, Huey became dominant to her and could chase her off a food pile merely by approaching it. Huey was also observed to chase pups born in the spring of 1982 with little or no immediate retaliation by the dominant adult group members. Schaller and Crawshaw (1919) remarked that a new dominant male may kill old, unrelated young and if Huey had attempted to take over the group this chasing of the young may have been an attempt to remove unrelated (or in this case, less related) pups. There was never any contact observed between Huey and a pup he was chasing.

Whenever a pregnant female gives birth she immediately became dominant to the other females. In 1981 three females had litters. Simone had hers in June, Scruffy had her little in July and Maude gave birth in September. Although Maude was the oldest and most dominant animals during the observations recorded here, she was continually chased from the core of the group following the birth of Simone's litter, through the birth of Scruffy's litter and did not regain her former dominance until she gave birth to her litter in September. Her current dominant status held following the birth of a litter in May 1982 which coincided with a litter thrown to Scruffy.

It is apparent that a number of interesting differences exist between our group and those observed by Ojasti (1973), Macdonald (1981) and Schaller and Crawshaw (1981). It is important to point out, however, that our study represents the first attempt to determine actual management parameters for capybaras in captivity. Although Donaldson et al (1975) describe several similar findings, their animals were kept separate for 6 months of the year and had to reestablish dominance following release in the spring. She reports fighting between females but her study population comprised 1.2 animals--hardly enough to make a safe conclusion on capybara behavior. Although we found female-female aggression to be prevalent, our population was much larger (at one point 19 animals were maintained) and we did have a predominance of females. The large size of the adult male may have precluded any possibility of a challenge. As a side note, whereas Donaldson et al, 1975, observed no interspecific aggression with the other species in their exhibit, we found a fairly regular, albeit not common, tendency for capybaras to lunge at and bite tapirs who were feeding from the hay pile.

Our population was made up of a harem with one male and several females and also several subordinate males and females. Schaller and Crawshaw (1981) found this group composition to be one of a number of capybara group structures. With such an agreement between field and captive study, we believe that our exhibit approximates a semi-natural habitat and as such represents an excellent population for detailed study of behavior that is difficult to study in the field (e.g. scent marking).

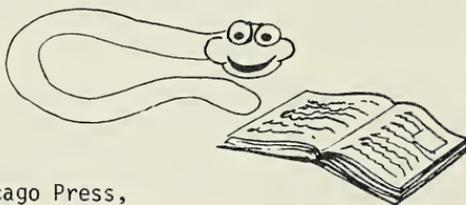
Provided that there is sufficient room for escape from attack, and partitioning of available natural resources, a large group of capybaras can be successfully managed as a zoological park exhibit. Ongoing studies on various aspects of capybara behavior should yield greater understanding of this rodent's social organization.

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# Book Review



## The Vertebrate Story

By Alfred Sherwood Romer  
Published by The University of Chicago Press,  
5801 S. Ellis Ave., Chicago, IL 60637  
1959; 440 pp.

*Review by Rise Dmytriv  
Keeper, Indianapolis Zoo*

The Vertebrate Story, written by A. Romer, Harvard Professor of Zoology, is a complete revision and reorganization of his well-known Man and the Vertebrates. While both works encompass the evolutionary history of the vertebrates from the earliest fishes through man, The Vertebrate Story concentrates less on comparative human anatomy and embryology, dealing in greater depths with fishes, amphibians, reptiles, and lower mammals.

While Professor Romer takes the reader through 400 million years of evolution with clear style and humor, he pauses often to examine and explain the characters and natural history of each major group. Together with numerous plates and illustrations, The Vertebrate Story is easily comprehended even to those with only a rudimentary understanding of physiology and anatomy, demonstrating a sense of timelessness and continuity in the animal world.

For anyone interested in the evolution or natural history of these creatures, both past and present which have given rise to man, The Vertebrate Story, a \$6.95, is a wealth of information at a bargain basement price, deserving a place in every zookeeper's library.

We are indebted to the AAZPA Newsletter for allowing us to reprint portions of this section from their "Positions Available" listing. This is a monthly service to use, for you.

ANIMAL TECHNICIAN (Senior Keeper)...requires completion of associate degree in life science, plus two years' specialized experience in husbandry of great apes, primates, and small mammals. Prior supervisory experience is desirable. Salary \$1028.00-\$1463.00 per month plus excellent fringe benefits. Send resume by 30 December 1982 to Earl Unell, Chief Examiner, City Hall, Personnel Dept., 414 East 12th St., Kansas City, MO 64106. EOE.

ELEPHANT KEEPER...responsible for care and maintenance of two elephants (one Asian, one African). Requires minimum of one years' experience. Send resume and references to: Hayes Caldwell, Executive Director, Caldwell Zoo, Box 428, Tyler, TX 75710.

CURATOR/MANAGER...Stone Memorial Game Ranch. Responsible for animal management, exhibit maintenance, development, supervision of animal staff and budget activities. Must work in cooperation with maintenance and concession staff. Requires BS in Zoology or related field and prior experience. Position available L January 1983. Send resume to Jerry Hegstrom, Atlanta Zoological Society, 800 Cherokee Ave., SW, Atlanta, GA 30315. (404) 624-1235.

CURATOR...requires 3 years' supervisory experience plus orientation toward education programs and Bachelor's degree. Responsible for animal management, education department and volunteer program. Salary \$19,600 plus fringe benefits. Submit resume to: Richard Ryan, Director, Turtle Back Zoo, 560 Northfield Ave., West Orange, NJ 07052.

EDUCATION CURATOR...requires public speaking, writing and animal care abilities. Weekend, Holidays, occasional after-hours and out-of-town assignments. Must recruit and supervise volunteers. Requires degree in biology or zoology and 5 years' experience in AAZPA member zoo (without degree, additional experience required). Salary \$12,900. Send resume to Tim Jones, Director, Central Texas Zoo, Rt. 10, Box 173-E, Waco, TX 76708.

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FROM THE AKF STAFF . . . . 

The editorial staff of Animal Keepers' Forum is pleased to once again bring AAZK members this expanded edition which not only contains some of our regular features but also the many fine papers presented at the National AAZK Conference in Toronto. Also included is an Index of articles from the past twelve issues of the Forum. We would like to thank all AAZK members for their continued support and encouragement of our efforts. A special thanks to those members who submitted papers or art work as well as monthly B&H updates, chapter news etc. Copies of this Special Edition will be sent to all members. A limited number of additional copies have been ordered and may be purchased from the National Office for \$6 which includes postage. We look forward to a great year in 1983 and with your continued support, we know it will be!

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## TROPICAL HABITAT EXHIBITS WORKSHOP

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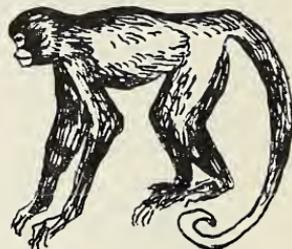
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