

Animal Keepers' Forum

JULY 1988



Dedicated to Professional Animal Care

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*This month's cover art is by Yoshi. Yonetani, of ZooDel (Zoo Design and Education Lab,) in Kobe, Japan. Yoshi's cover features San Diego Zoo Keeper Kirstie "Boo" Shaw who works in the Children's Zoo. She is shown bottle-feeding her favorite animal, a baby pygmy hippo. If you would like the opportunity to possibly be the subject of an **AKF** cover art piece drawn by Yoshi, see the item under this month's "Information Please". Thanks, Yoshi!*

Scoops and Scuttlebutt

REMINDER: Chapters Invited to Submit Bids for 1990 National Conference

The site for the 16th National AAZK Conference in 1990 will be voted on at the upcoming conference in Tucson. The Association invites interested Chapters to submit bids to host the 1990 conference. Any Chapter may submit a bid to host either a national or regional conference. As stated in the AAZK By-laws and Constitution, all bids must be approved by the Board of Directors before the Chapter may begin advertising the conference.

Bids should include a letter of intent to host the conference from the Chapter president. Support letters of approval from the zoo's director as well as from the mayor or other relevant persons or agencies (e.g. zoological society, city council, convention center, etc.) should also be included. The original letters and four copies of each letter should be sent to the AAZK Vice President for distribution to the Board.

The Board of Directors serves the AAZK membership to advise local Chapters about conference plans. The Board's experience with national and regional conferences is tapped to give conference planners the best opportunity for a successful conference. The Conference Book Committee provides a complete outline and summary of conference planning.

National Conference bid presentations are made at the annual national conference. If two or more Chapters bid for a national conference, the attending membership will vote on the site following bid presentations early in the conference week. Bids for hosting Regional Conferences **must** be submitted to the AAZK Board of Directors at least **six months** prior to the planned conference date.

Questions about procedure or planning should be directed to Phil Pennock, Conference Book Committee Chairman at the Woodland Park Zoo in Seattle, WA, or to AAZK Vice President, Oliver Claffey at Metro Toronto Zoo.

How AKF Deadlines Work: an explanation from the Editor

This is just a note to clear up some confusion which has arisen about how soon after submission an article will be published. While in the "Information for Contributors" section on the back inside cover it states that the deadline for **AKF** is the 15th of each month, that does not necessarily mean that **all** material received by the 15th will appear in the next month's issue. Over the past several years submissions to **AKF** have continued to increase in volume. Because of budgetary limitations it is not possible to print issues much larger than the usual 36 pages. The only exception is the December Conference Proceedings issue. We have a continual backlog of articles awaiting publication. In each issue we attempt to have a balance of content, which means, for example, if we have three articles on elephants we do not print them all in the same issue. There are certain sections of **AKF** (such as

Scoops and Scuttlebutt. *Continued*

Births & Hatchings, Chapter News, Coming Events, Scoops & Scuttlebutt) as well as any other **timely** notices (i.e. Information Request, Keeper's Alert, Opportunity Knocks, etc.) which we make every effort to publish in the issue closest to the time the submission was received. Publishing all of the longer articles we receive by the 15th of each month is just not feasible, but we make every effort to publish material as soon after submission as possible. So, if you have submitted an article to AKF and wondered why it has not been published yet, please be patient and understand our financial limitations concerning size of each issue. We appreciate your continued support of AKF.

In Memorium

The AAZK Board of Directors and the staff of AKF wish to extend their condolences to Ron Kaufman, Curator of Education at Topeka Zoological Park and honorary Life member in AAZK, on the death of his wife, Jane. She died on June 9, 1988 at age 32. She also leaves behind a four-year-old son, Garrett. Ron was one of the original founders of Animal Keepers' Forum and served as its Executive Editor until 1981. It was Ron's dedication, professionalism and enthusiasm which helped launch AKF and assisted in its growth over the years.



From the President...

This month's Forum contains a revision of the by-laws of the Association. It is vital that all members review these changes and comment on them if you feel some of the changes are either unwarranted or are unclear and require additional clarification. The reason for this year's major changes are past problems where our policies were not clearly understood. Please take some time right now and look over these changes and compare them to the old by-laws of 1986. If you do not have a copy of the current by-laws, you can contact Barbara Manspeaker at National Headquarters for one.

The Tucson Conference Committee is putting together an excellent preview of this year's national meeting. Their accommodations and provisions appear to be outstanding and I am certain that they will follow in the path of previous conferences, making this year's finer than ever. I encourage all members to try to attend, present a paper or just go to talk with colleagues both in zoos and those associated with animal care. Our conferences allow us the opportunity to learn from professionals in all areas of animal care and conservation-related fields. Anyone interested in animal-related issues should feel welcome to attend and speak with anyone attending.

Recently some Chapters have contacted me regarding questions about who may hold Chapter offices. While we have clarified this issue in the revised by-laws, there may still be situations which need to be handled on an individual basis. We do not want to set an inflexible standard with our by-laws and so encourage any Chapter with problems or questions to contact their RC's and/or Board Members to make us all aware of their particular situation.

We are obviously undergoing some changes in the Association, but they are the direct result of input from Chapters and individual members. Thank you for letting us know your concerns. I hope that you will continue to do so.

Frank B. Kohn, President

Coming Events

Northeast Chapter Workshop

July 20, 1988

Seattle, WA

To be held at Woodland Park Zoological Gardens, 5500 Phinney Avenue, North, in the ARC building. Workshop will include discussion on AAZK membership issues, status of Chapters and Chapter members, Recruitment of members, Chapter projects/activities, Officer responsibilities, Chapter Liaisons, and Conferences. All Chapters in the northwest regional are invited to attend. Also any other AAZK member who may be in the area, please join in. The workshop is free and dinner is provided. If you are interested in attending or want more information, contact: *Debbera Stecher* at (206) 625-5402 (w) or (206) 745-8198 (h).

AZAD Annual Conference

September 9-12, 1988

Baltimore, MD

Association of Zoo and Aquarium Docents will be hosted by the National Aquarium in Baltimore and the Baltimore Zoological Society. For further information, contact: *AZAD Conference, Baltimore Zoo, Druid Hill Park, Baltimore, MD 21217-4599 (301) 576-3886.*

14th National AAZK Conference

September 11-15, 1988

Tucson, AZ

Hosted by the Tucson AAZK Chapter. Watch your *AKF* for registration forms, agenda details and announcements. For more information contact: *Ed Hansen or George Montgomery, Tucson Chapter AAZK, P.O. Box 43908, Tucson, AZ 85733-3908.*

AAZPA Annual Conference

September 25-29, 1988

Milwaukee, WI

Hosted by the Milwaukee County Zoo. For further information contact: *Kerry Bublitz, Public Relations & Advertising Coordinator, Milwaukee County Zoo, 10001 W. Bluemound Rd., Milwaukee, WI 53226.*

The First International Symposium on Spectacled Bears

October 14-15, 1988

Chicago, IL

To be held at the Lincoln Park Zoo. Topics focusing on current field studies and captive management/reproduction of the spectacled bear will be highlighted. These include: captive management, demographics, reproduction in captivity, nutrition, vocalization and mother/infant behavior. For further information contact: *Mark Rosenthal, Curator of Mammals, Lincoln Park Zoo, 2200 N. Cannon Drive, Chicago, IL 60614, (312) 294-4660.*

NOTICE: The Scholl Conference on the Nutrition of Captive Wild Animals will not be held in 1988. The next Nutrition Conference will be held in late 1989 at the Lincoln Park Zoo. Any persons interested in submitting papers for the 1989 conference should contact: *Dr. Thomas P. Meehan, Lincoln Park Zoo, 2200 N. Cannon Dr., Chicago, IL 60614 (312) 294-4689.*



NOTICE TO MEMBERSHIP By-LAWS REVISION

At the 1987 National Conference in Milwaukee, the Board of Directors appointed a special committee to review the Association's by-laws. Several vague issues were the focus, but a general review was in order due to our growth. Below are the changes which the committee has suggested and the Board feels necessary.

These changes affect membership, chapters, meetings, revenues and refine our focus on our goals as an Association.

Compare these changes with the current by-laws of 1986. Copies of the by-laws may be found in your 1985 Membership Directory or may be obtained from Barbara Manspecker at Headquarters.

These revisions will be voted on by the attending membership at the 1988 National Conference in Tucson. On behalf of the Association I hereby give notice of these intended changes as specified in our current by-laws in Article IV, section 1c. Anyone wishing to comment on or question any of these changes should direct correspondence to Barbara Manspecker at Headquarters or to myself. Legal assessment to insure that these revisions comply with the corporation statutes of the State of Kansas, the site where the Association is incorporated, is required before final ratification is possible.



Frank B. Kohn
AAZK President

(Editor's note: In the following proposed revisions, the revised portions are underlined. SC)

Statement of Purpose of the American Association of Zoo Keepers, Inc.

This Association is organized not for profit, and is an organization incorporated exclusively for charitable, scientific and educational purposes. The objects and purposes shall be:

- Section 1 To promote and establish good relationships among professional zoo keepers; to promote and establish a means to stimulate incentive and create greater interest in the zoo keeping profession; and to promote greater communication with members of the profession through projects that will strengthen the zoo keeper's job knowledge.

- Section 2 To support and publicize our concern for all valid and deserving projects of conservation and to do out part in educating the general public to the need for worthwhile projects of preserving our natural resources and animal life.

- Section 3 To establish materials beneficial to zoo keeper education.

By-laws Revisions, Continued

Section 4 AAZK is not a labor union and makes no claims to a negotiating position.

By-Laws of the American Association of Zoo Keepers, Inc.

ARTICLE II- Membership

Section 3 Chapters of the Association may be established and must be chartered by the Association in accordance with the procedures in the by-laws as established by the Board of Directors.

Section 4 Any person who joins a local chartered Chapter must also be a paid-up member of the National body, in order to be recognized as a *bonafide* member of the Association.

Preface to Section 7: There shall be six categories of membership in the Association.

Section 7d International

Any member living outside the Continent of North America and who may fall into any of the categories listed in Sections 7a, b, or c. This category of membership shall not be entitled to vote or to hold elective or appointed office.

Section 7e Library

Any institution whose primary function is to lend out reading materials, books, magazines, periodicals, etc. This category of membership is restricted to a subscription to *Animal Keepers' Forum* only and shall not be entitled to vote or to hold elective or appointed office.

Section 7f Contributing

Any organization or individual who wishes to contribute the sum of Fifty Dollars (\$50.00) to the treasury of the Association for any use deemed suitable by the Directors of the Association. This category of membership shall not be entitled to vote or to hold elective or appointed office.

Section 8a Any member who is in default of the annual payment of dues or assessments shall be sent two notices of such default. If, at that time, payment has still not been received, then said defaulted member shall be stricken from the rolls and his or her membership terminated.

Section 8d ...The Board of Directors may appoint an *ad hoc* investigative committee to study each case. A conference call may be employed by the Board of Directors for resolution of the situation.

Section 10 National honorary lifetime members are...

Section 12 Fines and Penalties. Fine and penalties for misconduct are not permitted. The penalty for misconduct is suspension or termination, as provided above. Fines may be imposed for checks returned for insufficient funds.

By-laws Revisions. *Continued*

ARTICLE IV- Meetings

- Section 1h** Meetings of the Board of Directors shall be attended by a majority of three of the Board Members, in order to conduct business. In the event that it is not possible for a majority to be physically in attendance, than a conference telephone call or similar communications equipment shall be utilized, as provided for in Article V, Section 11, and such participation shall constitute presence in person at the meeting.
- Section 2** Conferences. Any Chapter may bid to host an Annual Conference in its area, to be held during the early Fall period of the year. Proposals prior to the bid must be made in writing to the Board of Directors. The bidding shall take place at an annual conference two years prior to the actual date of the proposed conference. The Chapter undertaking such an annual conference shall be provided with assistance and guidance by a special committee formed of members previously involved with the hosting of such a conference. In addition, a Chapter may seek permission in writing from the Board of Directors to host a Regional Conference in its area, to be held during the early Spring of the year so that it does not conflict with the Annual Conference. The primary purpose of such a Regional Conference is to accommodate local members who may not be able to travel a great distance to the area in which the Annual Conference is to be held. Bids for such Regional Conferences must be made one year prior to the scheduled date of the proposed conference. It is not the intent for either conference to compete one with the other, but to be complementary to each other.

ARTICLE V- Directors

- Section 2** ...Directors must be professional members.
- Section 4** ...In the absence of such designation, all meetings shall be held at the principle off ice of the Association. In addition, the President and Vice President shall meet with the staff of the Association's Principle Office, at the said Principle Office, as outlined in Article 1, Section 1 approximately six months prior to the Annual National Conference. The purpose of this meeting shall be to review the progress of the Association, and to discuss any matters deemed pertinent by either the Board of Directors, its Committees or any of the staff of the Association's Principle Office. Notice of such meeting is herewith dispensed.
- Section 7** ...when deposited in the United States or Canadian mail...
- Section 13** ...and receiving compensation therefore. However, in order that the Directors should not be out of pocket for expenses incurred for the Association, the said Directors shall be compensated for any legitimate expenses such as postage or telephone calls to other Directors, Committee members, or Association business-related persons. In addition, the hotel accommodations for the President attending the annual National Conference shall be paid for by the host chapter. Travel and accommodations for the employed Executive Staff to the annual National Conference shall be paid for by the Association. Travel and accommodations for the mid-year meeting shall be paid for by the Association for the President and Vice-president. Expenses for other attending Board Members shall be paid for as approved by majority of the Board Members. Registration, travel and accommodation expenses for the President to attend the national American Association of Zoological Parks and Aquariums (AAZPA) Conference shall be paid for by the

By-laws Revisions, Continued

Association. In the event of any discrepancy or controversy as to what shall constitute a legitimate expense, the Treasurer is hereby authorized to accept or reject such expense. Reimbursement of some expenses incurred by representatives of the Association may be approved of by the Board of Directors for certain circumstances.

Section 14 (Paragraph 5) ...must agree to appear at Board meetings...(usually in conjunction with the annual National Conference);...

ARTICLE 7- Miscellaneous

Section 11 The Association may accept and receive property, both real and personal, by gift, grant or bequest and may manage, hold, contract and dispose of same in accordance with the purposes of the Association.

Section 12 If at any time in the future the Association is dissolved, the total assets belonging to the Association shall be transferred to the treasury of the International Union for the Conservation of Nature and Natural Resource (IUCN) to be used in any manner consistent with the purposes of said Union.

Section 13 These by-laws will be reviewed annually at the Board of Director's mid-year meeting. Any revisions will be directed to an *ad hoc* committee appointed by the Board of Directors.



World Wildlife Fund Conservation Award



World Wildlife Fund is requesting nominations for the 1988 Conservation Award to be presented to an AAZK Chapter for its contributions to conservation. The selection will be based on the significance and impact of the Chapter's conservation project(s). Nominations should include a description of the project(s) along with reports, articles, press clippings, etc., that the project(s) produced. These projects can encompass education, research, or fund-raising for conservation activities. The nominated project(s) should be AAZK Chapter initiated and supported.

Please submit nominations to: *Rich Block, Director of Public Programs*
World Wildlife Fund
1250 24th Street, N.W.
Washington, DC 20037

The deadline for submitting nominations is 29 July 1988.

Births & Hatchings



Jackson Zoological Park...reports the following births and hatchings from January through April 1988: 0.0.5 Black Swan (*Cygnus atratus*), 0.0.1 Cereopsis goose (*Cereopsis novae hollandiae*), 0.0.1 King Vulture (*Sarcoramphus papa*); 1.0 Sitatunga (*Tragelaphus spekei*), 0.1 Reticulated giraffe (*Giraffa camelopardalis*), 0.1 Sable antelope (*Equus bruchelli*), 1.0 Reeves muntjac (*Muntiacus reevesi*); 1.0 Cotton-topped marmoset (*Saguinus oedupus*), 1.0 Lion-tailed macaque (*Macaca silenus*), 0.0.1 Black & white colobus (*Colobus gueruzas kinkuyensis*), 1.0 Pale-faced saki (*Pithecia*); 0.2 Snow leopards (*Panthera uncia*), these cubs are being raised successfully by their mother. 1.0 Giant Anteater (*Myrmecopaga tridactyla*)---this is the son of the arboreal anteater that you read about in the January issue of *AKF*. We can't wait to see if he is going to have the same climbing abilities as his mother. *submitted by Sheila Craft, Chapter Secretary, Jackson Zoological Park, Jackson, MS.*

Zoo Atlanta...births, hatchings and acquisitions from January to 1 May 1988 include 0.2 Black-neck swan, 2.1.2 Cape teal (0.0.2 DNS), 3.0.7 Silver teal, 0.1 Mona monkey and 3.6 Vietnamese pot-bellied pig (0.4 DNS). *submitted by Tim Kurkowski, Chapter Liaison, Zoo Atlanta, Atlanta, GA.*

Assiniboine Park Zoo...the Assiniboine Park Zookeeper's Association reports the following notable births and hatchings for the period January through March 1988: 2.0.1 Lion-tailed macaque, 0.0.2 Ringed-tail lemur, 0.0.1 Red-fronted lemur, 0.0.2 White-faced marmoset, 1.0 Vicuna, 1.0 Guanaco, 2.0.3 Addax, 0.0.1 Black-headed bulbul, 0.0.1 Red-headed bulbul, 0.0.1 Scarlet ibis, 0.0.1 Greyish saltator and 0.0.8 Purple ground dove. *submitted by Geoff Oliver, Liaison Officer, Assiniboine Park Zookeeper's Association.*

Silver Springs Attraction (FL)...reports the following births and hatchings from February through the first week in June: 3 Aoudad; 7 Blackbuck antelope, bringing our herd to 36 animals; 11 Mouflon, 0.3 Llama, 1.3 Reeves muntjac (0.1 DNS), 1 Spider monkey, 0.1 Sable antelope and 0.1 Grant's zebra. We also have done well with our baby ratites: 10 Emu, 31 Rhea (5 DNS) with three nests to go and 16 Ostrich (2 DNS) which were hatched in our incubator. Unfortunately our ostrich breeding program suffered a setback when our breeder male ostrich was struck by lightning in a bad storm and was killed. Further putting us to the test, the next day our giraffe barn burned to the ground. Luckily none of our nine Reticulated giraffe were injured. Our 18-foot male Baringo giraffe got a hold of some wiring leading to the floodlights that go on at night. Yes, it has been a busy Spring. *submitted by Joanne Zeliff, Head Keeper.*

Busch Gardens/Tampa... Among the B & H for May 1988 were: 2.0 Reticulated giraffe, 3.2 Springbok, 1.1 Greater kudu, 0.3 Uganda kob, 1.3 Blesbok, 0.0.1 Grant's zebra, 4.2 Impala, 0.0.1 Sugar glider, 0.1 Addra gazelle; 0.0.7 Black-necked swan, 0.0.7 African grey parrot, 0.0.4 Illiger's macaw, 0.0.2 White-bellied caique, 0.0.4 Yellow-billed hornbill and 0.0.2 Red-crested touraco. *submitted by Mary Eisenacher, Animal Records, Busch Gardens/Tampa, FL.*

Births & Hatchings, *Continued*

Bronx Zoo Chapter...announces the following significant births and hatchings for April and May 1988. The Dept. of Mammology proudly announces the birth on 30 May of a male Malay tapir (*Tapirus indicus*), after a gestation period of 414 days. Weighing 24 pounds on his third day, he has grown considerably since then and can be seen on exhibit with his mother in Jungle World. On 27 May 0.0.1 Prezewalski's horse (*Equus prezewalskii*) was born. This wild equid is known only in captivity and is an SSP-designated species. The Bronx Zoo has a major breeding program for them. In May, the pair of Small-clawed otters (*Aonyx cinerea*) in Jungle World gave birth to 1.5 pups, this was their third litter; they also are part of an SSP Plan. Another SSP species to give birth in May was the Barasingha (*Cervus duvauceli*), 2.2. May also saw 0.0.4 Pere David's deer (*Elephus davidianus*) born in the Rare Animal Range. In April 1.2 Gaur (*Bos gaurus*) were born. These large bovids are in an SSP Program and the Bronx Zoo maintains a strong and viable plan for them.

The Dept. of Ornithology hatched out 0.0.2 Costa's hummingbirds (*Calypte costae*) on 21 May. These delicate birds have been historically difficult to maintain in captivity, so the two chicks were a thrill to see in their tiny nest of cotton and cobwebs. In May, 0.0.5 Waldrapp ibis (*Geronticus eremita*) hatched in Jungle World. This species is highly endangered in the wild and the Bronx Zoo has been successful in raising Waldrapp for the last two years and they will soon be shipping some to other zoos to establish their own colonies. April and May each saw a Malayan peacock pheasant (*Polyplectron malacense malacense*) hatch. The Bronx Zoo has a very important collection of Malayan peacock pheasants.

The Dept. of Herpetology was pleased at the hatching of the Travancore tortoise (*Geochelone travancorica*) which is a species of tortoise that has had little field work done on it and is rarely kept, must less bred in zoos. *submitted by Wendy Worth, Corresponding Secretary and Mark Hofling, President, Bronx Zoo Chapter AAZK.*

Breeding the Arrau (Orinoco River Turtle) in Captivity for the First Time

By

*John Seyjagat, Head Keeper
Emperor Valley Zoo
Port-of-Spain, Trinidad, W.I.*

The Arrau (*Podocnemis expansa*), a member of the family Plomedusidae, is the largest living pleurodire and the second largest of the freshwater crypyodires. Arrau has a wide range in the Orinoco and Amazon river basin. Today, due to over-hunting, their colonies and nesting sites are greatly reduced resulting in the Arrau being a rare species for the entire upper Amazon and it being designated an Appendix II animal by CITES.

The Emperor Valley Zoo has had in its collection for many years four (1.3) Arruas. In 1984, upon the advice of the Director Mr. Hans Boos and the encouragement of Dr. Peter Pritchard, I set about establishing a breeding program.

After four years of constant monitoring, trials and errors, five layings and four attempted nestings, the pay-off was great--on 25 April 1988, three of 37 baby Arrau hatched.

On 20 February 1988 at 1700 hrs, a female Arrau climbed onto the nestsite and laid 42 eggs. After an incubation period of 64 days, three babies hatched on 25 April. On 1 May four hatched, on 2 May three hatched, and on 9 May 27 hatched. Of the other five eggs four died with fully developed embryos and one was infertile.

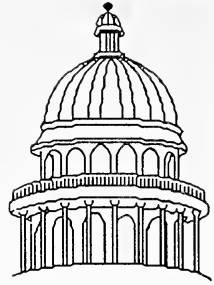
I wish to thank reptile keepers Kevin Adams, Nirmal Biptah, Nicholas Leith and Bernadine Rhagubir without whom this success would not have been possible.



Legislative Outlook

By

John Stoddard
AAZK Legislative Advisor
Brookfield Zoo, Brookfield, IL



FWS announces humane transport enforcement policy

In the 23 May Federal Register the Fish and Wildlife Service (FWS) outlined its policy for enforcing the regulations of the Humane and Healthful Transport of Wild Animals and Birds to the United States. (See Jan. and Mar. issues of AKE.)

The humane transport regulations were published in their final form in the 10 Nov. 1987 Federal Register and had been scheduled to take effect on 8 Feb. 1988. After the final rule had been published, however, concerns raised by several affected groups, including AAZPA, led the FWS to delay implementation of the regulations. The opposing groups felt that the regulations were unclear and unworkable, and in some cases could actually result in inhumane shipping conditions.

In this policy statement, the FWS indicated that it will review the regulations for the purpose of improving and clarifying them, but that during this review period the regulations will be enforced in a "reasonable and prudent manner." A court order applies the regulations retroactively to 8 Feb. 1988. Responsible parties are expected to comply with the regulations as published, but the FWS recognizes that there "may be special circumstances where strict compliance with these regulations would not be in the best interest of the wildlife, or where strict compliance would provide no additional benefit to the wildlife and would be highly impracticable." Any deviation from the regulations will be examined on a case-by-case basis, with the responsible party bearing the responsibility for showing that such special circumstances exist. The FWS intends to refer any violations "which could result in identifiable harm, distress, injury, or death of the wildlife" to the Department of Justice for prosecution.

> *From Federal Register (23 May 1988) and AAZPA Legislation Committee*

Pending legislation

H.R. 4335 — National Biological Diversity Conservation and Environmental Research Act

This bill would establish a coordinated, comprehensive federal strategy to halt the loss of biological diversity and to restore diversity through natural recovery and active management. This approach concentrates on maintaining ecosystem conditions necessary to support a broad range of species, unlike most current conservation laws which concentrate on the protection of individual species which have suffered major declines, often to critical numbers.

The bill calls for 1) a nationally coordinated effort to collect, analyze, and disseminate adequate information to understand biological diversity; 2) support of basic biological and ecological research necessary to conserve biological diversity; 3) explicit assessment of the effects on biological diversity in environmental impact statements; 4) establishment of a

Legislative Update. *Continued*

federal strategy for conservation of biological diversity; 5) establishment of a mechanism for coordinating efforts to preserve biological diversity and natural environments; and 6) educating the U.S. citizens about the importance of biological diversity.

Status: In joint committee. (Science, Space, and Technology; Merchant Marine and Fisheries) Hearings scheduled during June.

FWS listing changes — protection approved

Bay checkerspot butterfly **Threatened** (*Euphrades editha bayensis*)

A colorful, medium-sized butterfly (wingspan up to 2.5 inches), the bay checkerspot is dependent on the few remaining "islands" of serpentine grasslands that provide food for its larval stages. Much of its former habitat has been altered by drought, urban development, road construction, livestock overgrazing, and other uses that have altered the native plant communities. Recorded historically from 16 areas on the San Francisco peninsula, the bay checkerspot is now found in only a few sites in the San Francisco Bay area.

Pawnee mountain skipper **Threatened** (*Hesperia leonardus montana*)

This small, brownish-yellow butterfly is restricted to the Platte River drainage in central Colorado, where it inhabits open, dry, ponderosa pine (*Pinus ponderosa*) woodlands on steep slopes. Some habitat has been eliminated by housing and other development, road building, and the construction of a reservoir. Another proposed reservoir project would further reduce the available habitat.

Little Colorado spinedance **Threatened** (*Lepidomeda vittata*)

A small member of the minnow family, this species is usually less than 4 inches in length. It was abundant historically throughout the upper drainage of the Little Colorado River in Arizona, but currently survives only in sections of 5 tributaries. Much of its free-flowing stream habitat has been degraded by impoundments, removal of water from the streams, channelization, grazing, road building, urban growth, and other activities. The introduction of non-native, competing and predatory fish species, and the use of fish poisons to remove so-called "trash" fish has also contributed to its decline.

Cape Fear shiner **Endangered** (*Notropis mekistocholas*)

The Cape Fear shiner is restricted to three locations in the Cape Fear River drainage in eastern North Carolina. This species, which rarely exceeds 2 inches in length, inhabits free-flowing streams over rocky substrates. Reservoir construction has flooded much of its former habitat, and deteriorating water quality is a continuing problem. The Endangered status reflects the shiner's vulnerability to a single catastrophic event, such as a chemical spill, due to its reduced range and numbers.

Black-capped vireo **Endangered** (*Vireo atricapillus*)

This songbird, which is distinguished by its black or slate gray crown, faces threats from habitat modification and nest parasitism by the brown-headed cowbird (*Molothrus ater*). The vireo's once extensive breeding range has been reduced to sites within three small areas in central Oklahoma, Texas, and northern Mexico.

Legislative Update, Continued

Roseate tern — (northeastern U.S. and Canada population) (Caribbean population-incl. Florida and the Bahamas) (<i>Sterna dougalli dougalli</i>)	Endangered Threatened
--	----------------------------------

Similar in appearance to most other terns, this species nests only in small, localized colonies along marine coasts. The number of suitable breeding sites for this ground-nesting bird has greatly diminished in recent years due to oceanside development and human disturbance, competition from expanding gull populations, and predation.

Hualapai vole (<i>Microtus mexicanus hualpaiensis</i>)	Endangered
--	-------------------

A very rare, mouse-sized animal, the Hualapai vole is known to occur only in the Hualapai Mountains of northwestern Arizona. It has one of the most restricted habitats of any North American animal. Its habitat is threatened by livestock grazing, human recreation, and other factors.

Sand skink (<i>Neoseps reynoldsi</i>)	Threatened
---	-------------------

Blue-tailed mole skink (<i>Eumeces egregius lividus</i>)	Threatened
--	-------------------

Both of these lizards are endemic to central Florida and depend on scrub habitat with sandy substrates. Urbanization and conversion of land into citrus groves have eliminated much of their former habitat, and development is continuing rapidly.

> From USFWS (*Endangered Species Technical Bulletin*, Oct. 1987 and Nov./Dec. 1987)

Have any good photos? The AAZK Public Education Committee is looking for photo contributions to be used in the "Zookeeping As A Career" poster project. Photo submitted should show keepers working in the areas of Animal Care, Research, Conservation and Education. We need color photographs in 5" x 7" or 8" x 10" size, or send a negative with your regular size photo. Send photos to: Tom LaBarge, c/o Burnet Park Zoo, 500 Burnet Park Drive, Syracuse, NY 13204.



AAZK Welcomes New Professional Members

Carol Ann Gaffney, W.D. Stone Zoo (MA)	Lisa M. Hayes, Franklin Park Zoo (MA)
Gregory Marrero, Bronx Zoo (NY)	Karin M. Andra, Bronx Zoo (NY)
Thomas Probst, Bronx Zoo (NY)	Gail E. Turner, Seneca Park Zoo (NY)
Gina Hennigan, Utica Zoo (NY)	Dan Maloney, Philadelphia Zoo (PA)
Bill Garrett, Catoctin Mt. Zoo (MD)	Patti Lynn Page, North Carolina Zoo
Sue Ellen White, Riverbanks Zoo (SC)	Gegory C. Greer, Zoo Atlanta (GA)
Lisa Marshall, Miami Metrozoo (FL)	William R. Stiffler, Miami Museum of Science (FL)
Asofouvale V. Pili, Lowry Park Zoo (FL)	Gretchen Wehrmeister, Ft. Wayne Zoo
Beth Skiles, Ft. Wayne Children's Zoo (IN)	Scott E. Wisherd, Lake Superior Zoo (WI)
Mary L. Wykstra, Binder Park Zoo (MI)	Lisa M. Chelstrom, Univ. of Minnesota
Dedrae Schadeegg, Minnesota Zool. Gdns. (MN)	John Kitchen, Los Angeles Zoo (CA)
Kurt Falkenbach, Wilderness Safari (MO)	Harold W. Mountain, Fresno Zoo (CA)
Pilar Rinky, San Diego Wild Animal Park (CA)	Alexander Weiss, San Francisco Zoo (CA)
Laura L. Belt, California Living Museum (CA)	John Stoner, Metro Toronto Zoo (CAN)
Richard Ball, Honolulu Zoo (HI)	Gary B. Ruczak, Assiniboine Pk. Zoo (CAN)
Andrew Lentini, Metro Toronto Zoo (CAN)	Guy Beauregard, Zoo de Granby (CAN)
Robert Hopkins, Assiniboine Pk. Zoo (CAN)	





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Meet The New AAZK Board Members.....

**Bob Debets, Assiniboine Park Zoo
Winnipeg, Manitoba, Canada**



It was 1975 when I first applied for a keeper position at the Assiniboine Park Zoo. Since that time I have worked in all areas (sections) of the zoo. I found my particular specialty and interest to be with primates. They captured my heart almost immediately. Over the years I've spent most of my extra time in reading and acquiring information about them.

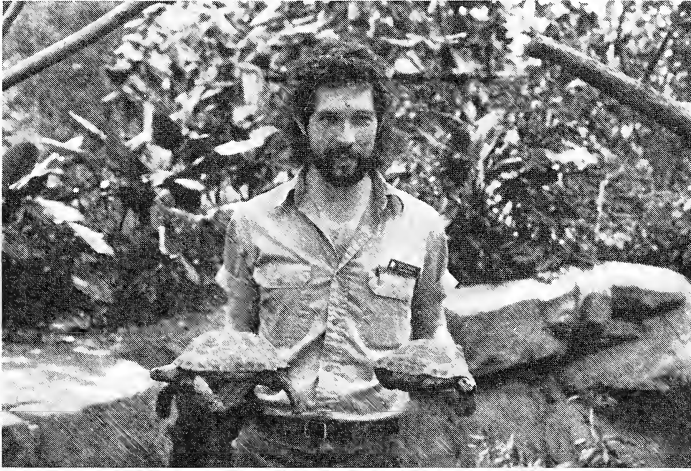
Presently I am working in the zoo's commissary along with another keeper. We prepare diets and order supplies to insure that all the animals have the proper nutritionally-balanced food.

I first heard about AAZK in 1982 and attended my first conference in Toronto that same year with two other keepers from Winnipeg. We were quite impressed with the camaraderie and friendliness of the attending delegates. We found ourselves inspired by the dedication of the other delegates to their profession. When we returned home, a Chapter was chartered three months later. I was elected President and held that position for four years. During my term the Chapter hosted the 12th National AAZK Conference of which I was one of the three co-chairs. Since hosting that conference the management at our zoo treats keepers with a new kind of respect. The organization has also given the keepers at the Assiniboine Park Zoo a common goal of striving to become professional individuals in their chosen profession.

I would invite any keeper who hasn't yet joined AAZK to attend the 14th National AAZK Conference in Tucson, and welcome all those who have joined us in the past. If you do attend, I am confident that you will be well informed, enlightened and will find a new delight in your job. Also, before you go home, you will be bitten by the AAZK Conference bug and probably will attend all of the conferences in future years.

---Bob Debets

Brint Spencer
Minnesota Zoological Gardens
Apple Valley, MN



All little boys are supposed to be fascinated by snakes. They then outgrow this phase and go on with the rest of their lives. At least that is what my parents thought. I have always been interested in animals in general, and snakes in particular. I started with dinosaurs and when I figured out that I could never have one for a pet, I took a step up the evolutionary ladder, hit reptiles and have been stuck there ever since.

My formative years were spent in Delaware where high school classmates remember me for the snakes and raccoon that would appear in the library when I was there. My junior year I was the youngest person to complete the Docent training class at the Philadelphia Zoo. The following summer I got a job at the Brandywine Zoo in Wilmington, DE. Summers, weekends and holidays for the next seven years were spent trying to get as much experience as possible. I also spent two years working in a pet shop, six months in a fish wholesale store, and would identify snakes for the local medical clinics when they were brought in with snakebite victims. In 1979 I graduated from the University of Delaware with a major in biology, and a minor in anthropology, and began to look for a full-time position.

I was hired at the Minnesota Zoo as a keeper in the Minnesota Trail and worked with a variety of native wildlife including wolverine, beaver and otter. In 1984 I was promoted to senior keeper of reptiles and worked on designing new exhibits and developing snakebite procedures. The visiting public has such an incredible love-hate relationship with snakes that it gives the keeper tremendous latitude in developing educational programs. Feeding reptiles during public hours and interpreting the behavior allows the keeper to direct the visitor's worst reptile vision into a positive experience.

Related activities include serving as a member of the board of directors for the Minnesota Herpetological Society, and zoo liaison and regional herpetological society committee member for the Society for the Study of Amphibians and Reptiles. I am currently a snakebite consultant for St. Paul-Ramsey Medical Center. I am also an avid volleyball player and collector of zoo and herp-related books and paraphernalia.

Meet Your New Board Members, Continued

My involvement with the national AAZK evolved from my frustration to generate enthusiasm at the local level and started with my appointment as reptile coordinator of the Diet Notebook.

AAZK is an organization that has always strived to improve the position of the keeper and the zookeeping profession. As we enter our second decade the results of this work are beginning to show. Publications such as Biological Values, Zoonotic Diseases Handbook and the soon to be published Diet Notebook along with the videotape and training materials projects are all examples of the care and concern which keepers have for their profession, themselves and the animals that come under their charge. In the next two decades we will hopefully see further contributions by keepers in the areas of keeper safety and training, animal management, public and professional education, and conservation. Each AAZK project started as a thought that somebody took the time to nurture to fruition. How many more unnurtured thoughts have yet to come to light?

In the meantime, my parents have come to realize that I am probably not going to grow up and get a "real job".

--Brint Spencer



Information Please

The Daily Report Forms our zoo uses are adequate, but could use some improvement. I would like to have Chapter Liaisons or others from various zoos send a copy of their Daily Report Forms and any other general use forms they feel might help. Anyone wishing copies may contact me. Send forms to: *Tim Marshall, Zoo Keeper I, Sunset Zoo, 11th & Poyntz, Manhattan, KS 66502.*

The Denver Zoo Hospital is compiling a nursery protocol manual. We are now in the process of collecting information and would greatly appreciate a copy of your manual or standard nursery forms. We are also interested in any comments or suggestions that would make our manual more helpful. Send manuals, information, comments to: *Cynthia Bickel, Denver Zoological Gardens, City Park, Denver, CO 80205.*

A NOTE FROM THE COVER ARTIST: Yoshi would like to have keepers send him clear photos of themselves working with their animals to use as models for future cover art for AKF. If your photo is selected by Yoshi as a model for an AKF cover, you will receive the original artwork after its publication on the cover. Yoshi asks that along with your photo, you might be so kind as to send any printed materials, stickers, guidebooks, posters, patches, etc. which are representative of your zoological facility. These will be used by the staff at Zoo/DEL for reference and ideas on how other zoos use these items to promote their institutions. Please note that it is not possible to return your photograph and no guarantee is made that every photograph received will be used as an AKF cover. Please send photos and zoo-related materials from your facility to: Yoshi. Yonetani, Zoo-DEL (Zoo Design & Education Lab), 2-15 Nagate 1-chome, Nada-ku, Kobe, 657 JAPAN.



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You will receive a complete tour of our facilities, from design through fabrication and construction. As you walk through our design department you will see exhibits being designed for zoos and museums around the country and will get a peek at our model shop.

In Shop 1, tree fabrication is always in progress, and while crossing our yard you will see our inventory of GFRC cast rock panels for rock features. You might even see a full-size bottlenose dolphin being cast in Shop 2.

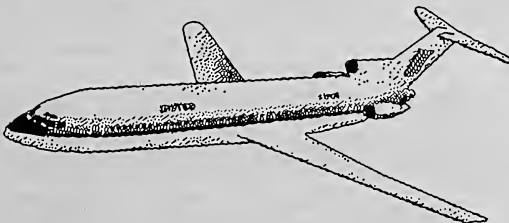
We look forward to meeting you!

* * * * *

ATTENTION DELEGATES

Complimentary transportation will be provided from Tucson International Airport to the conference hotel for all registered delegates. Delegates arriving in Tucson on Thursday or Friday before the conference can obtain transportation by going directly to the Arizona Stagecoach Depot outside the main entrance to the terminal to your right. Please identify yourself as a delegate to the AAZK Conference and your destination as the Doubletree Resort Hotel. Delegates arriving on Saturday and Sunday may board a shuttle van leaving from the Continental/Eastern terminal, baggage claim area. Delegates arriving after 8:00 p.m. on any day may arrange free transportation by simply dialing the Doubletree Resort Hotel (881-4200) from the house phones located near the information booth in the baggage claim areas.

When registering, delegates will be asked to schedule their departure dates and times on a sign-up sheet so that we can coordinate shuttles to the airport at the conclusion of the conference.



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RETURN THIS FORM TO:

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Tucson Chapter/AAZK
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Tucson, AZ 85733-3908

1988 AAZK NATIONAL CONFERENCE REGISTRATION
FORM

SEPTEMBER 11-15, 1988
Tucson, AZ

PLEASE TYPE OR PRINT (one name only per form please)

Name _____

Address _____

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Zoo Affiliation _____

AAZK Committee Member _____

Are you attending your first conference? Yes _____ No _____

Will be submitting a paper: Yes _____ No _____

(\$25.00 will be refunded from registration fee on acceptance of paper)

Participating in Zoolympics: Yes _____ No _____

Bringing an auction item: Yes _____ No _____ (describe briefly) _____

Vegetarian: Yes _____ No _____ (Specify type) _____

Are you interested in a conference T-Shirt? Yes _____ No _____ (S M L XL)

AAZK Membership status and fees:

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CONFERENCE '88 - FINAL CALL FOR PAPERS

Papers will be accepted on all aspects of zookeeping, notable births, diets, etc. and horticulture in the zoo profession. This year the 14th National AAZK Conference will be held in conjunction with the 8th National Association of Zoological Horticulture Conference and a forum to present animal/horticulture related papers will be available at a joint paper session.

Papers will be published in the *Forum*, so use the "Guidelines for Typing Papers for AAZK Conference Proceedings". The guidelines were published in the June 1988 issue of *AKF* in the gold insert section. Examples of papers may be found in the December 1987 issue of the *Forum*.

Papers will be limited to 20 minutes followed by a five-minute question period. An outline or abstract **MUST** be submitted by 15 July 1988, along with the following information to be considered for acceptance:

Name of presenter _____

Zoo affiliation _____

Position/title _____

Title of paper _____

Equipment needed _____

Send to:

Karen Bongratz, Program Chairperson
AAZK Conference '88
P.O. Box 43908
Tucson, AZ 85733-3908

On The Desert

By
Mike Seidman, Keeper
Phoenix Zoo, Phoenix, AZ

(Editor's note: To all those AAZK members planning on attending the 1988 National Conference in Tucson, AZ, here is a piece exploring the many facets of the unique ecosystem known as The Desert.)

One-seventh of the world's land is desert

All deserts are located between 15-30° latitude, north and south of the equator, where the wind circulation produces hot, dry descending air. Local factors may also contribute to the formation of deserts, for example, mountains on the windward side of a land mass, producing what is known as a rain shadow desert on the downwind side.

Deserts may be defined as places in which evaporation exceeds precipitation.

Rainfall in deserts averages around 10" a year, often less. Daytime temperatures in the summer may reach or exceed 110° F on a regular basis and, due to the absence of cloud or plant cover, drop 40° at night.

Water is the critical problem for life in the desert. All plants and animals normally lose water to the environment as a result of growth and maintenance activities; in the low humidity of deserts, the rate of water loss can be dangerously high.

Since evaporation of water is also a cooling process, allowing organisms to keep their internal temperatures down, the main problem for every desert-living plant and animal is: how to prevent over-heating without using too much water to do it.

Plant Adaptations

Desert plants compete for water rather than light; seeking it at different levels helps minimize this competition.

Creosote bushes produce far more growth underground than above-ground. Cacti have shallow, superficial roots which catch water from the slightest rain. Mesquite trees may send tap roots several hundred feet down in search of water.

Three broad adaptations of desert plants to drought: tolerance, resistance, avoidance.

A very few plants are tolerant to drought, i.e. their tissues may dehydrate to some extent while the plant continues to remain active.

Creosote bush (*Larrea tridentata*), perhaps the best adapted of all desert plants, is able to grow a special set of leaves when temperatures remain hot; these leaves are able to function in a drier state than any other kind of leaf known.

Most desert plants are unable to tolerate desiccation and have evolved methods of resisting it.

The shape of certain cacti, e.g. the saguaro, tall and stick-like, exposes the least surface area to the sun and the largest possible area away from it, from which heat may be radiated.

The Desert, Continued

Leaves, the main source of water loss in plants, have been the focal point of adaptations, their size, shape, texture and even their very existence determined by desert forces.

The most common solution is reduced leaf size, presenting less evaporating surface to the air.

Many plants, including the ocotillo and palo verdes may drop their small leaves during periods of prolonged dry heat.

Some plants, e.g. cacti, have no leaves at all, these having been modified into spines, which help shade and protect the plant. Photosynthesis takes place in the stem, which is green with chlorophyll. This is also true of Palo Verde trees.

A major way of resisting drought is through succulence, the storage of water in spongy tissue, forming a sap that can resist the pull of the hot dry air. This tissue may also be pleated to allow for expansion and contraction, depending on the amount of water contained.

The third main plant adaptation to the desert is in time not space. Annual plants avoid the drought by growing and completing their life cycle, from seed to plant to seed in a matter of weeks, only after a certain amount of rain has occurred at the right time of year. During their short period of existence, they are, for all practical purposes, not living in a desert.

Although in general, the plants of the desert make little mark on the desert itself, they may be of benefit to each other. Many of the large shrubs and small trees of the Sonoran Desert are in the legume family. Many legumes harbor bacteria on their roots which are capable of producing nitrogen, the nutrient most lacking in the desert soil. The most common legumes of the Sonoran Desert are Palo Verdes, Mesquites, Ironwood and several acacias.

Animal Adaptations

Animals too must solve the problem of high temperatures and limited water. Small animals are especially vulnerable to rapid gains in body temperature and/or water loss. The mobility of animals allows them to escape the worst heat and actively search for water. Behavioral adaptations tend to substitute for structural ones.

Among the most successful and abundant desert animals are insects, rodents and reptiles. Most of their water is acquired from green plants. Carnivores receive most of their water from their insect and rodent prey.

Preventing the loss of water is an important to desert animals as acquiring it. Water is lost from the body in several ways: from the respiratory tract as water vapor, from the digestive system as urine and feces and, in mammals, through the skin.

Reptiles and insects have water resistant exteriors, probably because they originated in arid environments millions of years ago.

The most important behavioral adaptation of small animals is the use of burrows.

On a hot summer day, ground surface temperatures may reach 180°F but two inches below the surface, the temperature may drop 12-15°; at one-foot down, the temperature may be half.

Nocturnal animals, including most species of snakes and rodents, sleep underground during the day, foraging at night under cooler, more humid skies.

The Desert, *Continued*

Diurnal animals, e.g. most lizards and some rodents, cool themselves in burrows at intervals between active periods.

Lizards spend much of their lives thermo-regulating, either through body postures oriented to the sun or through choice of substrate.

Some lizards, e.g. whiptails (*Cnemidophorus spp.*) and the Desert Iguana (*Dipsosaurus dorsalis*) can tolerate very high body temperatures before adjustments need to be made.

The Desert Iguana can sustain a body temperature of 115°F for brief periods, the highest of any known vertebrate.

Large animals spend most of the day in caves or rock crevices or in the shade of desert trees and shrubs.

In addition to these behavioral adjustments, some desert rodents show striking physiological adaptations.

The Antelope Ground Squirrel may subsist on dry food alone for 3-5 weeks, tolerating dehydration with little problem. It too may allow its body temperature to rise with the air temperature, without having to regulate it through the loss of water--until it reaches a critical point, about 110°F. At that time, if flattening itself on cooler ground does not help, it will retreat to its burrow, where its body temperature may then drop 7°F in three minutes. These and other adaptations allow these animals to be active and diurnal all year.

The Round-tail Ground Squirrel adapts to the heat by remaining underground (estivation) through much of the year, avoiding harsh desert conditions in a way similar to the annual plants.

Perhaps the most complete set of adaptations may be found in the kangaroo rat. Not only does it get all its water need satisfied by seeds alone, it is also able, through a super-efficient kidney, to concentrate its urine 5X more than people, and so loses very little precious water that way. Since, however, it is not as tolerant of heat as the Antelope Ground squirrel, it must be nocturnal.

The Sonoran Desert

There are four deserts in western North America, all of them present, in varying degrees, in Arizona.

The Great Basin Desert, which extends north into Oregon and Washington, is characterized by very low winter temperatures and an abundance of sagebrush.

The Mohave Desert of Nevada and California receives winter rains only and is indicated by the presence of the Joshua Tree, a type of yucca.

The Chihuahuan Desert, extending into New Mexico, Texas and northeast Mexico, receives only summer rains, and is typified by certain species of Agave and Yucca.

The Sonoran Desert, extending from just north of Phoenix south and west into Mexico, is characterized by summer and winter rains and the presence of large numbers of succulents. In Arizona, it is typified by the saguaro.

There are several subdivisions of the Sonoran Desert, differing in such ways as the type of soil and the severity of the winters. The Organ Pipe and Old Man cacti, for example, both found in a small area of southern Arizona, are really most at home further south in Mexico, where there is no frost.

The saguaro, on the other hand, is most common in the subsection between Phoenix and Tucson, as it tolerates frost somewhat better. The richest area, in terms of numbers and variety of cacti and other succulents, is Baja California, Mexico.

The Desert. *Continued*

Even within a subdivision, the desert is by no means all the same.

Low, flat areas, periodically flooded, contain high concentrations of salt and tend to be dominated by one or two plants, usually either saltbushes (*Atriplex spp.*) or Creosote bush.

Raised areas, around desert foothills and mountains, support more cacti and small desert trees. The soil is deeper, rockier and better aerated and the climate is somewhat modified by the topographic relief.

In areas with permanent or semi-permanent streams, a different community of plants is found, dominated by broad-leafed trees such as cottonwoods and willows.

The numerous mountain ranges over 4000' in Arizona are essentially islands where non-desert-adapted organisms may flourish by going up in altitude rather than north in latitude. These organisms are effectively imprisoned there by the surrounding desert, often resulting in distinct forms unique to the area.



Chapter News

Toledo AAZK Chapter

Our Chapter is currently involved in planning our annual employee picnic and sponsoring a concert by a popular local band on 2 July. Proceeds from the concert will be used to help send delegates to the National AAZK Conference in September.

The second meeting of our Regional Liaison Committee was held on 7 June. The committee is very encouraged by the responses from Chapters in our region and the future looks great.

--Bill Whittaker
Chapter Liaison

National Zoo AAZK Chapter

At our April Chapter meeting at the National Zoo, AAZK President Frank Kohn accepted this painting (see photo) from AAZK Chapter Co-President Eric Krussman. The story of the painting started at the Miami AAZK Conference in 1985. During the auction, which Frank was unable to attend, several friends bought items in Frank's name, the painting being one of them. Frank disposed of the picture but it came back to haunt him at Winnipeg '86 and then

showed up again in Milwaukee '87. Finally, thinking he was permanently rid of the painting, Frank joked about never having to see it again when he was in Topeka in April for the mid-year meeting of the AAZK Board of Directors.

Well, once again, Frank, the picture is in your hands!

--Eric Krussman
Chapter Co-President



Chapter News, Continued

Bronx Zoo Chapter AAZK

Our Chapter has had several interesting lectures this past month. Dave MacLean of the Seatuck Institute was one of the speakers. The Institute is an organization which specializes in suburban wildlife research with its emphasis on shorebirds. The most recent lecture was presented by the head veterinarian at the Bronx Zoo, Dr. Emil Solensek. Part of the lecture was on techniques of animal handling and restraint and the rest was on his trip to Zaire.

Our recycling program for aluminum cans is very successful, averaging 300 cans per week. Our Chapter patches with our new logo arrived (see June 1988 Chapter News for a drawing of it). The proceeds from their sale will be used to support the purchase of 110,000 acres of prime rainforest in Belize, Central America. This project is a joint venture by the New York Zoological Society, the Nature Conservancy, and the Massachusetts Audubon Society. If you are interested in knowing more about this, see the May issue of Natural History magazine or write to us.

---Wendy Worth
Corres. Sec'y

San Diego AAZK Chapter

On 16 June, members of the San Diego AAZK Chapter held their 2nd Annual WAP Evening Monorail Ride at the Wild Animal Park. On 28 July, the Chapter will hear a presentation by Dr. Jim Oosterhuis on "Lameness & Orthopedics". A WAP Caravan Tour is planned for 26 August for all Chapter members. In September the Chapter is also planning a behind-the-scenes tour at Sea World.

At a special meeting in April, the Chapter approved the recommended annual Chapter dues of \$12.00. A \$100 Life Member category is also available.

The Chapter's newsletter, The Keeper, continues to improve now that it is being generated with the help of a computer desktop publishing system.

---The Keeper, June '88

From the Ngare Sergoi Support Group:

In March of this year, the Toledo Zoo AAZK Chapter held a "Bowling for Rhinos" fundraiser for Anna Merz's Ngare Sergoi Rhino Sanctuary. It was the most successful fundraiser to date.

Four AAZK Chapters competed: Ft. Wayne Children's Zoo, Detroit Zoo, Columbus Zoo and the Toledo Zoo. Funds raised were: Toledo - \$4,205.67; Columbus - \$1,099.19; Ft. Wayne - \$229.21; and Detroit - \$190.00.

I would like to thank all who contributed and a very special thanks to Bill Whittaker, Betsy Clark, Suzanne Husbands and Sharon Simmons for making it work.

On behalf of Anna, and the Ngare Sergoi Support Group, my heartfelt thanks.

---Andy Lodge

All AAZK Chapters which produce an in-house newsletter are requested to please add National Headquarters to your mailing list. Also, if you have not as yet sent in a sample of your Chapter logo, please do so. We would like to have as complete a file on logos as possible before the Tucson Conference so that we can put together a display of Chapter logos. If you have a Chapter patch, consider sending one to National for display on the "Piece of Your Zoo" patch board. Many Thanks!

Chapters are reminded to send information for the Chapter News column by the 15th of each month. Include new officers, projects, etc.



VIEWPOINT

Zookeeping is a state of mind--not a job.

By

Liz Arnold, AAZK Affiliate Member
Venom Research Laboratory
Veterans Administration Medical Center
Salt Lake City, UT

I strongly agree with the opinions of Wayne Hazlett (*AKF*, April 1988, p. 120) and of Kevin Patton (*AKF*, May 1988, p. 163). I am both a long-time zoo docent and a reptile keeper for a non-zoo research institution. I am saddened and frustrated by being excluded from "Professional" membership in AAZK, which I first joined in 1973 when I was a full-time keeper. With a master's degree in biology I feel thoroughly professional; and the longevity and good health of our animals attest to my practice of good zookeeping principles in our facility. My eighteen years of service as a docent for Hogle Zoo demonstrates that I support education, recreation, and conservation. I want very much to be a full voting member of AAZK, but I don't qualify under the present narrow guidelines. This old-fashioned class distinction is losing money and talented prospective members for AAZK. After all, a modern zoo staff is becoming more inter-disciplinary every day.

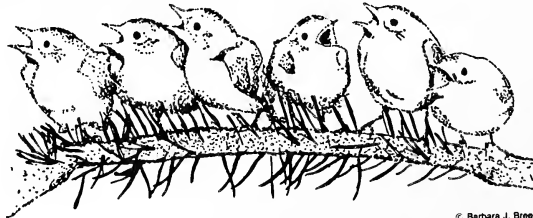
Therefore, I humbly suggest that membership categories be simplified to three:

Regular--Voting--full price, all interested persons
Student--interested, but poor
Contributing--the rich and famous, and institutions

Also, the Directory Information Card should ask for the work address separately from the zoo affiliation.

I hope that both the Board and the voting members assembled in Tucson this fall will discuss this problem, and will decide to rescue the rest of us from limbo. Thanks.

(Editor's note: It has come to my attention that there are many individuals who are not certain whether or not they qualify for "Professional" member status in AAZK. The following is quoted from the current By-laws of AAZK and may help to clear up some of the confusion. Article II, Section 6a states: "Professional: Permanent full-time zoo or aquarium keepers, lab technicians, and any other personnel directly connected with the care and feeding of captive wildlife in recognized zoological parks, aquariums, animal reserves, or any other animal care facility. This also includes retired animal keepers with at least ten (10) years service prior to retirement, and who were professional members of the Association during the year previous to his or her retirement. Professional members of the United States and Canada only shall be entitled to vote and hold elective office." If you have questions about which category of membership you qualify for, contact Headquarters.)



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The International Society for Endangered Cats

By
John Becker, Ph. D.
Executive Director
Columbus, OH



A new felid conservation organization has been established with headquarters in Columbus, OH. The organization, the International Society for Endangered Cats, has targeted 21 species of exotic cats as species for which conservation strategies will be established that can prevent the extinction of these species.

These strategies include:

1. The gathering of a comprehensive data bank of information which can complement the ISIS data by providing an informational bridge to the private sector;
2. The establishment of studbooks for all species of exotic cats;
3. Cooperation in the development of SSP programs for each species;
4. Building facilities in Ohio and other locations so that representative samplings of the genetic pool for each of the 21 species can be acquired, and research can be conducted which will lead to the successful breeding of each species;
5. Developing a breeding loan exchange program so that viable populations of each species can be established at zoological institutions throughout the world;
6. Sponsoring research in the wild wherever feasible; developing facilities and breeding programs in native countries and providing information and keeper exchange so that zoological professionals in other countries can maximize their breeding success with these species;
7. Establishing extensive wildlife conservation educational programs for the United States and the native countries of the cats;
8. And, to work for the establishment of protected areas in the native countries so that, when feasible, the cats, propagated in captivity, can be successfully reintroduced into their natural habitat.

Although a relatively new organization, the ISEC has attracted an outstanding team of zoological professionals from around the world who recognize the severe plight of the cats, and who are totally committed to the goals and objectives of ISEC. We are, obviously, quite eager to include all those people in the zoological field who have expertise with the exotic cats and/or a sincere interest in seeing the various species propagated into the future, as part of the ISEC team.

The ISEC encourages your membership in our organization, and seeks to establish ISEC chapters across the country. We will also be establishing affiliations with many institutions around the world, and look forward to your participation in these programs. For more information about membership, volunteer involvement, or the establishment of an ISEC chapter in your area, please write to: *Dr. John Becker, c/o ISEC, 4638 Winterset Dr., Columbus, OH 43220, or call at 1-800-272-CATS.*

Dolphins in Captivity

By

Alan Bowmaker, Director
South African Association for Marine Biological Research
Durban, South Africa

(Editor's note: This article is reprinted from *The Naturalist*, the journal of the Wildlife Society of Southern Africa, Vol. 31, Part 2, July 1987, with permission of the author.)

The keeping of dolphins in captivity has become, for some, a highly charged emotional issue; one extreme believing absolutely nothing justifies the practice. At Sea World, we have a great deal of sympathy for this point, for by the very nature of our work and our interests, we are inclined towards this point of view. On balance, however, we believe that the advantages outweigh the disadvantages, and discussion of this issue is pertinent to this edition of the *Naturalist*.

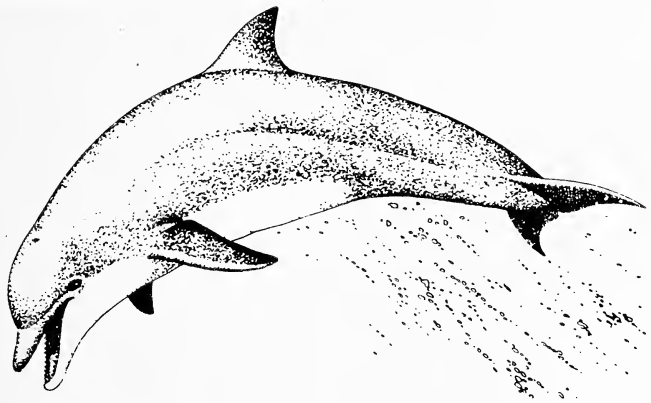
Here we have an animal with a brain as large as that of man, but more tellingly, with a neocortical development as comprehensive. Presumably this brain development has arisen in conjunction with the ability to use sound as a perceptive device, for the full development of the use of sound navigation and ranging (SONAR) necessarily requires a complex neuronal system to allow its interpretation. For dolphins, using their sonar, are able to discriminate between two different types of metals of the same shape, or between different shapes of the same metal or between, astonishingly, a 1cm long gelatin capsule filled either with fish or with water --and this from the distance of six meters. Yet a brain developed primarily for one task can easily use excess capacity for others, as seen in man. It is for this reason that there has been a preoccupation with studies in dolphin communication. Are dolphins intelligent? Have they a language? The first question elicits a morass of indecision arising from the definition of intelligence, itself the cause of much discussion amongst scientists; and in the second instance the considerable research which has been carried out in the field of dolphin communication has to date proved fruitless.

Any person with an affinity for animals, and many without, have some experience where an animal they are close to (be it dog, cat, parrot, horse, or whatever) apparently interprets intentions through thought transference. In many instances it can be argued, quite correctly, that the "message" is passed behaviorally, but there are many others where this does not seem possible, leading to intriguing possibilities -- for there can be no doubt that most people who have been intimately involved with dolphins for any length of time become deeply affected by them. More so, I believe, than people involved with other animals. A little credence is lent to these speculations perhaps, by another flight of fancy: the apparent humanitarianism shown by dolphins in rescuing drowning people. Here we have a group of animals, which are warm blooded, air breathing and which suckle their young. These characteristics are hardly compatible with their reversion to an aquatic environment. Their ultimate danger is from drowning and an innate survival response to this would seem vital to their success. A response of this nature can be found in the birth process when the newborn calf is frequently guided to the surface for its first breath by an attendant female (the 'midwife'). This behavior may be practiced right across species and genera (lending support to the speculation that it is innate). A pilot whale, for example, has been recorded guiding a newborn bottlenosed dolphin to the surface of a dolphinarium pool and helping with the removal of the afterbirth. Wounded dolphins have also been observed to be supported at the surface by one or two companions. A drowning person is hardly likely to provide either the right noises or the correct behavior in his or her flounderings to trigger a rescue response from dolphins. Alternatively, the trauma would at some stage give rise to a tremendous fear response in the brain. Is this

Dolphins in Captivity, *Continued*

what the dolphins react to? Whatever the answers may be to these and many other of the questions these fascinating animals generate, we will not reach them all without the close contact that is offered by dolphinaria.

It is convenient for me, in discussing the problem, to use some of the attitudes and experiences of Sea World, Durban. This is part of the South African Association of Marine Biological Research, which is an association not for gain and which supports the Oceanographic Research Institute. This Institute has been conducting critical marine research for the last 25 years and has provided the baseline data for the conservation and management of the coastal resources of Natal.



Education is an extremely important function of the Association and the three to four hundred thousand people who visit the complex annually do so in most instances to be entertained. The opportunity is taken, however, to instill in these visitors an awareness of the need to conserve the sea and its creatures--by displaying a fascinating array of sea creatures which included a show designed to illustrate the beauty, strength and capabilities of live dolphins. There is no doubt in my mind that the animals captivate all who experience them in the intentionally light-hearted atmosphere and that the first hand, close-up exposure to live animals has far greater impact than could be achieved on film. It is these audiences who will provide the support necessary in the future.....when pressures will inevitably be brought to bear on wild dolphin populations, pressures generated by human population growth. These will arise for two possible reasons - the use of dolphins directly as a food source, or their control as a result of their competition for fish stocks. However preposterous this may seem to be now, both are probabilities: for dolphins are already being used for food on the South African coastline, illegal though this may be. A single Indian Ocean bottlenose dolphin, a moderately sized species, eats in the region of 10kg of fish per day or 3.6 tons per annum in captivity. A school of 30 dolphins will consume 108 tons. Extrapolate this figure to the considerable population of dolphins around the coast and one has a significant drain on a resource in which man will become more and more dependent. It could be said that in these circumstances moralities will prevail and dolphins will not be exploited or controlled. But even now our community has split loyalties, for many dolphins are killed inadvertently in shark nets year year. This will not, however, stop the practice of netting potential man-eaters. Perhaps moralities would prevail if sufficient people provide the political support which will be needed, created by a strong feeling of sympathy for these animals, created in turn by media exposure, but far more effectively by the personal exposure of as many people as possible to these animals in dolphinaria. (Would the Blue Whale be close to extinction if the public could have experienced this vast and beautiful creature close up and alive? - an impossible task because of the species' size, but nevertheless a valid question).

It follows that, coupled with the vital need to influence public attitudes, the effective

Dolphins in Captivity, *Continued*

conservation and management of dolphins is dependent on what we know of them, in turn dependent on the research which is carried out on them. To be meaningful, studies of wild animals invariably require a duplicated approach--namely, field and captive studies. They are complementary, for each is incomplete without the other.

Field studies are largely observational unless, as is usually the case, samples of animals are sacrificed to obtain "hard" data. Captive studies on the other hand provide "hard" information. Usually, however, results have to be interpreted with the effects of captivity on the animal in mind, for the behavior of the animal will be affected to varying degrees; being dependent on both the conditions of captivity and the species being studied.

As dolphins are permanently aquatic it is self-evident that field studies of these animals are of limited value and the value of knowledge gained from captive animals, albeit at times aberrant, is enhanced. The careful interpretation of characteristics such as behavioral interactions, food intake and selectivity, gestation period, longevity and the birth process, can add greatly to our knowledge of these fascinating creatures. The first step is however, to ensure that captive conditions are acceptable to the animals and that their health is maintained. Conditions in the dolphinarium far surpassed American and European standards for dolphinariums before the holding pool was doubled in 1985. Sea World, Durban now has two sub-adult dolphins born in the facility, aged 36 and 12 months, having had five dolphin births, a mortality rate of 60%. This distressing infant mortality appears to equate with estimates made of wild dolphin stocks and is encouraging for it strongly suggests that the animals in the facility are well adjusted.

The research efforts of the Association has therefore been preoccupied with the *husbandry* of marine mammals in its care and is accumulating publications in the field. During the twelve years of its existence considerable expertise has been developed in the capture, transportation and husbandry of dolphins. Most of this knowledge is not suitable for scientific publication but provides a focus of local expertise which has proven invaluable. It is frequently necessary, in captive studies of animals, to induce stress in the interests of research. We are most reluctant to undertake this type of research as it is against the principles of both the institution and the people who work in it.

During the eight years that I have been involved with dolphins and the problems derived from holding them captive, a great change in approach and attitude of dolphinariums has evolved world-wide. Whereas previously there had been a great deal of suspicion and secrecy (commercial or national security), we have a situation now where there is a greater degree of professionalism and a free movement of information, largely derived from the two international organizations involved - the International Marine Animal Trainers Association (IMATA) and the International Association of Aquatic Animal Medicine (IAAAM). Many of the improvements which have taken place in dolphinariums have arisen from the agitation of members of these two bodies. Indeed, it is directly as a result of their own actions that a completely unacceptable dolphinarium in Israel was closed down.

Finally, we should ask ourselves how much less we would know of dolphins if they had never been held in captivity? There, then, are the reasons we believe that, on balance, the practice is justified. Not only justified, but essential for the well being of the wild dolphin population.



Call For Book Reviews

The AKF book review project is getting on track once again. If you are interested in reviewing a book appropriate for the AKF readership, please fill out the accompanying form and send it to me at the following address:

Rick Emmer
Cleveland Metroparks Zoo
3900 Brookside Park Drive
Cleveland, OH 44109

If you would like to review a book but do not have a particular one in mind, please drop me a line anyway; AKF occasionally stockpiles publication for review, and you may find one of them to be of interest.

Once you review a book, it is yours to keep -- not a bad deal!

With your help, we can continue to make the Book Review section an integral part of AKF.

---Rick Emmer, Book Review Coordinator

Book Review Request Form

1.) Your name and mailing address: _____

2.) Please provide the following information for as many as three books you would like to review. List books in preferential order.

#1: Title: _____

Author: _____

Publisher and Copyright date: _____

#2: Title: _____

Author: _____

Publisher and Copyright date: _____

#3: Title: _____

Author: _____

Publisher and Copyright date: _____



Hand-raising Infant Insectivorous Bats

(Update and Addendum to *Animal Keepers' Forum*,
11(8):254-257, 1984)

By

Susan M. Barnard, Lead Keeper
Dept. of Reptiles and Amphibians
Zoo Atlanta, Atlanta, GA

Introduction

People have historically reacted negatively toward bats because of gross misconceptions about them, hysterical media reporting, financial "milking" of clients by pest control companies and out of their own ignorance and superstition. The highly specialized mode of bats' living and feeding habits, their unusually low reproductive rate, their vulnerability to environmental changes, pesticide poisoning, vandalism to hibernating caves and most of all, the relentless hostility toward them by the public all contribute to the current rapid decline of bat species. By using hand-raised insectivorous bats in educational programs, zoos have the opportunity to emphasize the importance of conserving these highly beneficial animals.

Animals that are altricial and have been hand-reared are poor candidates for release into nature. Too often orphans are weaned from a formula and quickly tossed back into the wild to fend for themselves. The human surrogate mother is left with a sense of well-being and accomplishment, while the victims starve slowly out of sight. Young bats depend on their mothers to learn their hunting skills, and until rehabilitators have developed a repatriation program, hand-raised, insectivorous bats should not be released into nature.

Handling

Materials: Soft, lightweight cloth

When handling a newly acquired baby bat, there is usually the thought in one's mind that it may be rabid. Bats are not, however, "carriers" of the rabies virus, but like other mammals they are susceptible to infection. Although less than one-half of one percent of bats may contact rabies, and it is unlikely that an infant bat could transmit the virus, you should exercise reasonable caution when handling your infant. You may wish to manipulate your baby bat(s) with lightweight, soft material such as a face cloth or handkerchief.

Upon touching your bat, it may feel cold. Temperate-zone bats are heterothermic animals and to conserve energy they drop their body temperatures to the ambient temperatures when asleep. Once touched, these bats awake and begin vibrating to warm themselves. Within minutes after awakening your bat, however, it will once again feel warm. It is for this reason that infant bats be maintained in a warm environment (about 80-82°F) until they are fully furred.

Feeding

Materials:

Powdered Esbilac®	1 small-sized jar top or petri dish (approx. 1 1/2-in. dia.)
Plastic eye dropper with pointed end	1 medium-sized jar top or petri dish (approx. 3-in. dia.)
Avitron® multivitamins	Medium-sized mealworms (Barnard, 1986)
Avimin® multiminerals	Blunt-ended tweezers

Hand-raising Infant Insectivorous Bats/Update and Addendum, Cont'd.

In north temperate regions bats give birth primarily in May and June. Neonates are hairless, but have milk teeth which allow them to cling to their mother's teat. These teeth are useless for eating insects, so beginning food must consist of a prepared milk diet, preferably Esbilac® (used as directed on label). Do not supplement the milk with syrups or vitamins as these may cause diarrhea. Infant bats should be fed frequently (approximately every 2 hours). If they show signs of rejecting food at 2-hour intervals, feed approximately every 3 hours, or adjust the feeding schedule as necessary. Feedings should begin around 6 a.m. and can be discontinued at about 11 p.m. It is not necessary to feed infant bats throughout the night. Infant bats will accept Esbilac® readily, a drop at a time, from the palm of the hand or directly from an eye-dropper [Fig. 1, Pg. 254, *AKF* 11(8)]. To prevent colic which can cause neonate deaths, avoid feeding bats with nursing bottles. Always allow an infant to feed while resting on its stomach as shown in Figure 1 (see reference above) to prevent it from aspirating fluids into its lungs.

Baby bats grow quickly. When fur begins to appear on your baby bat, it can be transferred gradually to a more substantial diet of mealworm intestines. Mealworm intestines should be squeezed into the infant bat's mouth as one would squeeze a tube of toothpaste. After the animal has eaten all it desires, offer it a few drops of water because baby bats dehydrate quickly.

Most infant bats are ready to fly at about 3 to 4 weeks of age. By this time their milk teeth have been replaced by their larger and stronger permanent teeth, and the infant is ready to receive chitin in its diet. Chitin constitutes the insect's exoskeleton, and is important to the bat for the formation of firm stools; therefore, allow your baby bat to eat mealworms during the "squeezing" process. When your infant bat is no longer receiving Esbilac®, and is eating whole mealworms, begin supplementing its diet with multivitamins (Polyvisol® or Avitron®) and multiminerals (Avimin®). DAILY, place 1 or 2 drops of multivitamins and 2 or 3 drops of multiminerals into each 10 mls of fresh water. Use shallow water containers such as small petri dishes or jar tops to allow the bat easy access. Offer mealworms in the evening at about 8 p.m. The following morning discard uneaten mealworms because your bat probably contaminated the insect larvae with feces and urine while feeding.

Housing

Materials:

Heating pad
Pillow case(s)

If making a plastic nursery:

5-gal. plastic bucket (as shown in Fig. 2, Pg. 256, *AKF* 11(8))
Wire screening or 1/4-in. hardware cloth
Strapping Tape

If making a styrofoam nursery:

Styrofoam picnic container
1-in. masking tape

Housing infant bats can be a problem, especially during the early hand-rearing period. It is very likely that anyone raising an infant bat will have to commute with it back and forth to work. The infant bat's home should provide it with warmth, and protect it from injury or escape. Also, it should be lightweight for ease of transport and cleaning. Two types of containers are appropriate for housing infant bats, a 5-gal. plastic bucket (Fig. 2, see reference above) with lid which comfortably holds up to six baby bats of the same species or a styrofoam picnic container which holds up to twelve baby bats. If too many infants are placed in a plastic container they will overheat and die. Within the container of choice.

Hand-raising Infant Insectivorous Bats/Update and Addendum, Cont'd.

place a heating pad (except when temperatures are above 75°F), and adjust its setting to LOW. Also place one or two soft pillow cases or laundry bags (without frayed edges) on top of the heating pad (Fig. 3, Pg. 256, AKF 11(8)). Either the plastic or styrofoam containers can be notched at the lips to allow the heating pad cord to exit the containers while the lids are tightly in place. If using a plastic bucket, cut an opening in the container's top and cover with screen or 1/4-in. hardware cloth to provide adequate ventilation. Ventilation can be provided in a styrofoam container by poking holes in it with an ice pick or other narrow, sharp instrument. Holes should be placed about 1 to 2 in. apart around the entire container. Punch 1 or 2 rows about 2 in. down from the container's lip. It is important not to make the holes so large as to allow a baby bat to escape.

Hygiene

Bats are clean animals and spend considerable time grooming themselves. However, bats do not appreciate a "sterile" environment. A reasonable amount of feces and urine in your bat's nursery will not compromise its health. Never use disinfectants, especially those that are aromatic or caustic. If it becomes necessary to clean the "batmobile", use a sponge with tap water. Do not, however, leave the container damp. Bats may become sick if maintained in a damp environment. **AVOID DRAFTS!**

Summary

Hand-raised, insectivorous bats should never be released into nature. Wild bats learn their hunting skills from their mothers. Unfortunately, hand-raised animals do not learn these skills and will starve to death if released.

AVOID the use of "bat glop" (Barnard, 1984) as a food source when hand-raising baby insectivorous bats. This preparation is extremely dehydrating and has been known to cause the deaths of infant bats (Barnard, unpublished observations).

Maintain infant insectivorous bats at about 80-82°F until they are fully furred.

Do not house adult bats in plastic buckets or styrofoam containers as described above. Adult bats require larger cage dimensions than infants, and they require roughened surfaces on which to exercise and perch. Lastly, once infant bats become about 6 weeks of age, they may attempt to chew through a styrofoam container. For further information on housing adult insectivorous, you may wish to contact the author for cage designs.

Literature Cited

- Barnard, S.M. 1984. Hand-raising infant insectivorous bats. *Animal Keepers' Forum*, 11(8):254-257.
- Barnard, S.M. 1986. Feeding captive insectivorous bats: maintenance of food colonies. *Animal Keepers' Forum*, 13(3):81-87.



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AAZK would like to announce that William Whittaker has assumed the position of RC for the States of MI, In, KY and Oh following the resignation of Linda Anstandig. The Association thanks Linda for her efforts on behalf of AAZK. Vacancies still exist for RC positions for the following two regions: (1) WA, OR, ID, MT, WY, and AK and (2) PA, DE, NJ, MD and the District of Columbia. If you are interested in either of these two positions, please contact one of the Regional Coordinator Co-Directors.

Need membership information? Want to learn more about AAZK or start a Chapter or become more active - then call your RC! They will be glad to assist you with any information you need about AAZK.

Institutions wishing to advertise employment opportunities are asked to send pertinent data by the 15th of each month to: Opportunity Knocks/AKF, 635 Gage Blvd., Topeka, KS 66606. Please include closing dates for positions available. There is no charge for this service and phone-in listings of positions which become available close to deadline are accepted.

CAREGIVER/CHIMPANZEES...requires B.A. in Zoology, Biology, Anthropology or related fields of study and ability to work well with peers. Commensurate experience will be considered. Assist in the responsibility for maintaining and caring for approximately 60 chimpanzees (*Pan troglodytes*). Should be interested in behavioral research that will add to the knowledge of captive chimpanzees and assist in improving management methods. Salary: \$12,000 plus benefits. NOTE: ALL personnel must have a negative T.B. skin test and a negative hepatitis B antigen test. Send letter of interest, resume and three (3) references to: Jo Fritz, Director, Primate Foundation of Arizona, P.O. Box 86, Tempe, AZ 85281.

ZOOKEEPER...requires high school diploma. College level biology courses and one (1) year's paid zoo experience desirable (relevant unpaid experience may substitute). Salary \$13,562-\$16,265 per year plus benefits. Recruiting for openings July 1988-December 1988. Send resume by **29 July, 1988** to: Personnel Dept., City of Topeka, P.O. Box 1996, Topeka, KS 66601.

MAMMAL KEEPERS...San Diego Zoo: Positions require demonstratable knowledge of mammalian husbandry, exhibition of animals, animal behavior, data gathering and reporting. Good communication skills are essential. Degree in biological sciences is highly desirable. Salary \$18,865 - \$21,340, commensurate with experience. Excellent benefits. Send resume and references by **25 July 1988** to: Personnel Department/Human Resources, Zoological Society of San Diego, P.O. Box 51, San Diego, CA 92112-0551. EOE M/F/H/V.

ANIMAL KEEPER/BIRD DEPT...Baltimore Zoo; Salary \$14,000 -- each candidate must have graduated from an accredited high school and have one year of paid experience in the care and handling of a variety of birds, excluding pets; or have 6 month's experience in the care and handling of animals in a zoological institution and have graduated from an accredited high school; or have a bachelor's degree from an accredited college or university in biology, zoology, animal science or veterinary technology. Eligibility for a driver's license is required. This is an entry level position under the direct supervision of a Senior Keeper and/or Curator. All resumes to be sent to: Fred Beall, Curator of Birds, Baltimore Zoo, Druid Hill Park, Baltimore, MD 21217. Deadline for acceptance of applications is **30 July 1988**.

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Keeper's Alert

Olive baboon (1.), 5 1/2 years old, desperately needs home in which he can be resocialized and maintained in a colony. Permanent donation, we can pay for relocation costs. If you are interested or know of any options available, please contact us immediately: Mary Edwards, St. Croix Animal Welfare Center, Box 6910 Sunny Isle, Christiansted, St. Croix, US Virgin Islands 00851-6910, Phone: (809) 778-1650 OR Hendriekje Hubers, P.O. Box 3992 M.S., Mayaguez, P.R. 00709, phone: (809) 833-7240.

AAZK Membership Application

Name _____ Check here if renewal []

Address _____

_____ \$25.00 Professional
Full-time Keepers

_____ \$20.00 Affiliate
Other staff & volunteers

_____ \$25.00 International
All members outside the
U.S. & Canada

_____ \$15.00 Associate
Those not connected
with an animal facility

_____ \$15.00 Library
Library subscription only

_____ \$50.00 Contributing
Organizations and
Individuals

Directory Information: Zoo: _____

Work Area: _____ Special Interests: _____

Mail this application and check or money order (U.S. CURRENCY ONLY PLEASE), payable to American Association of Zoo Keepers, Inc., to: AAZK National Headquarters, Topeka Zoo, 635 Gage Blvd., Topeka, KS 66606.

Membership includes a subscription to 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 for consideration.

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 no more than 6" x 10" (15cm x 25 1/2cm). Literature used should be cited in the text and in final bibliography. Avoid footnotes. Include scientific name of species the first time it is used. Thereafter use common name. Black and white photos only accepted.

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. Telephone 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 Ext. 31.

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

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Animal Keepers' Forum

August 1988



Dedicated to Professional Animal Care

ANIMAL KEEPERS' FORUM, 635 Gage Blvd., Topeka, KS 66606

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Assistant Editor: Alice Miser
Assistant Editor: Ron Ringer

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This month's cover features a Jaguar (Panthera onca) drawn by Geoff Creswell, a former elephant keeper at the Topeka Zoological Park. Like many of the great cats, the Jaguar is an endangered species which has continually lost ground in the wild due to habitat destruction and hunting. Its beautiful coat, such perfect camouflage in its native tropical jungles, also became a victim of fashion's whims. While protected in a number of its native habitats, it is still hunted and traded illegally. Geoff, who recently left Topeka for a sojourn in Burundi, Africa, dedicated this cover to the staff of the Topeka Zoo. Thank you, Geoff, and you will be missed!

Scoops

and

Scuttlebutt

1988-89 AAZK Membership Directory Update

The 1988-89 edition of the AAZK Membership Directory has been mailed gratis to all Professional, Contributing and Life members as part of their membership benefits. If you are a member in one of these three categories and were current as of 22 July, you should be receiving your copy soon. Professional and Contributing members who join after this date will be mailed a copy with their membership card at the time they join. Membership Directories are available for sale to Affiliate and Associate members for \$4.00 each. Non-members may purchase the Membership Directory for \$7.00. Directories may be ordered by sending a check or money order made payable to "AAZK" to: Directory Order, AAZK National Headquarters, 635 Gage Blvd., Topeka, KS 66606.

Please note that only those members who returned their Directory Information cards are listed in the current Directory. This is the first time the Directory has been compiled and edited by the AAZK staff using our desktop publishing computer software. We have made every effort to strive for correctness and accuracy, but undoubtedly this edition will contain some errors. We apologize in advance and please let us know if your listing is not correct so that it may be updated for the next edition of the Membership Directory. We encourage you to use the pages entitled "notes" at the end of the Directory to make additions as per the listing of new members published monthly in AKE.

Los Angeles AAZK Chapter Seeks Items for Auction

In October, the Los Angeles Zoo's AAZK Chapter is planning our big fundraising event: an auction of zoo memorabilia. We are planning to auction off such things as T-shirts and sweatshirts, zoo patches, coffee mugs, posters, signs, books, original artwork and crafts donated by zoo staff and patrons, and anything else we can acquire that is zoo-related. We would like to include as many items from other zoos and AAZK Chapters as possible. If your zoo or chapter would like to donate or exchange items, please contact or send items to: Kim Brinkley, L.A. AAZK Chapter Liaison, Los Angeles Zoo, 5333 Zoo Drive, Los Angeles, CA 90027.

Brookfield Zoo AAZK Chapters Publishes 'Zoo Stories' Book

The Brookfield Zoo Chapter is pleased to announce that the 'Zoo Stories' book is ready at last. The book consists of nearly 150 items submitted by keepers across the country (and even Australia) such as: anecdotes about keepers, animals, and visitors, mispronounced or misidentified animals, clever animal names, off-the-wall phone calls etc. The book costs \$3.50 and will be available at the Tucson conference or by mail from the Brookfield Zoo Chapter, 3300 Golf Road, Brookfield, IL 60513. When ordering by mail, please add 70 cents for postage.

Scoops and Scuttlebutt, Continued

Keeper Research Survey Reminder

If you have not already done so, please fill out and return the Survey on Keeper's Interest in Research found on pages 195-196 of the June issue of *AKF*. The material gleaned from this survey will be used by President Frank Kohn for a paper to be presented at the National AAZPA Conference in September and will subsequently be published in the *Forum*. Thanks to all those who have returned their survey and we encourage all others to do so as soon as possible.

New Location for Ordering Keeper Training Materials Manuals Announced

Due to a career move, Laura Trechsel, manual coordinator for the Keeper Training Materials Identification Project, is now located at the Minnesota Zoological Gardens. Laura was formerly located at the Folsom Children's Zoo in Lincoln, NE. Those individuals wishing to order reprints of training manual materials (see October 1987 *AKF*, page 306-309 for listing of manuals available), should place their order through Laura at the following address: Laura Trechsel, Minnesota Zoological Gardens, 12101 Johnny Cake Ridge Road, Apple Valley, MN 55124. Checks or money orders should be made payable to Laura Trechsel

Comprehensive 1987 AKF Index Available

A comprehensive index of the 1987 issues of *Animal Keepers Forum* has been compiled by Judie Steenberg, Keeper at Woodland Park Zoo, Seattle, WA, and Pam Talbot, a WPZ Volunteer. This index includes all subjects included in each of the 12 1987 issues of *AKF*. All animal species which appear in these issues are listed as well. Judie and Pam are currently working on compiling an historical index of all issues of *AKF* beginning with Vol. 1 of 1974. If anyone is interested in obtaining the completed 1987 comprehensive index, you may do so by sending \$1.00 (to cover copying costs and postage) along with your complete mailing address to: *AKF* Index, 635 Gage Blvd., Topeka, KS 66606.

A Note of Sympathy

The Board of Directors wishes to express their deepest sympathy to Bernie Feldman and his family on the death of their young daughter, Laura, who died on 18 July following a long battle with leukemia. Bernie, a keeper at the Burnet Park Zoo in Syracuse, NY, was the originator of the Animal Data Transfer Form and continues as its Project Head.



Keepers and Computers - A Survey

Any interested keepers are invited to participate in a survey of keepers' use of computers, both at work and at home. Results will be published in a future issue of *AKF*. Send responses to: Brookfield Zoo AAZK, Computer Survey, 3300 Golf Road, Brookfield, IL 60513.

- 1) Do you use a computer at work? At home?
- 2) Describe your system(s) and peripherals.
- 3) What do you use it for?
- 4) What software do you use?
- 5) Do you have a modem? Do you subscribe to any of the nationwide database services? (CompuServe, Source, GENie, etc.) Which ones?
- 6) What possible uses do you see for keepers using electronic bulletin boards, conferences, etc.?
- 7) Any other comments.
- 8) If you plan on attending the Tucson conference, would you be interested in getting together for a "rap" session?



From the President....

In about a month, many of us will be meeting in Tucson for the 14th National Conference. For those of you who are attending your first conference, please take this opportunity to learn as much about the organization as you can. This is a great chance to become actively involved with AAZK during a week of concentrated business when the flow of ideas and information exchange reaches its maximum level during the year. Those first time attendees, as well as conference veterans, return from the conference charged up with new ideas and this enthusiasm is often contagious among their colleagues. The Board welcomes your input, and any ideas you might have regarding the organization will have a forum during the Board Meeting as well as throughout the entire conference.

To date we are still seeking bids to host the 1990 annual conference. While such an endeavor appears challenging, the rewards of hosting a conference are great and past conference chairmen ease the task with their expert advice. I would like to encourage any Chapter to consider hosting a conference.

Last year the revised format for the Board Meetings lead to productive and efficient sessions. This year we will again follow the same structure by holding a closed session on Saturday, 10 September, followed by an open meeting for the entire membership on Sunday, 11 September. The closed meeting allows Board members time to discuss and clarify all projects and decide on budgets and courses for the many committees in our organization. These decisions are by no means permanent; the open meeting on Sunday allows committee chairpersons and interested members the opportunity to comment on the activities of the organization. If more time is needed to discuss individual AAZK items, a special time will be arranged during a slow time of the week in order to resolve all AAZK business before the close of the conference.

The Sunday meeting will begin at 8:00 a.m. and will adjourn at noon for an hour for lunch. The meeting will reconvene at 1:00 p.m. and run until 6:00 p.m. I'm hoping all business will be completed before dinner, but if not, the Board meeting will resume and continue until business has been completed.

In order to expedite these meetings, a certain protocol established last year will be followed. This protocol and the agenda of committee reports appears below.

If the agenda published in the AAZK for the open Board meeting scheduled for Sunday needs altering, a new agenda will be posted on the meeting room door beforehand. Hopefully this year we will have all annual reports posted on a public billboard for any interested AAZK member to examine before the topic is brought up for discussion during the open Board meeting. Once this meeting is in session, we will try to keep things moving along so that all business can be touched upon lightly and time is available to those members wanting to offer their input. The President, who will act as Presiding Officer at these Board meetings, is responsible for determining the direction of these sessions. The Vice-president will take charge of enforcing the basic rules for topics requiring some debate from those attending this scheduled event. Another Board member will act as time keeper for any AAZK items brought up for open discussion. If more time is needed to discuss problems with a specific project or committee, all discussion will end and a time and place will be assigned during a slow part of the conference week. All members attending will be expected to follow the following guidelines if they wish to participate in the open Board Meeting.



Frank B. Kohn
AAZK President

From the President, *Continued*

Afternoon - 12:00 noon to 6:00 p.m.

(12:00-1:00 p.m. meeting will adjourn for lunch)

KEEPER EDUCATION COMMITTEE
PUBLIC EDUCATION COMMITTEE
RESEARCH/GRANTS COMMITTEE
AWARDS COMMITTEE
AAZK LIAISON TO AAZPA AND IZE
PUBLIC RELATIONS LIAISON
ANNUAL CONFERENCES 1988-89
CONFERENCE BOOK COMMITTEE
LIBRARY RESOURCES
REFERENCE SEARCH
BOOK REVIEWS
LEGISLATIVE ADVISOR
STAFF EXCHANGE
KEEPER ACCOMMODATIONS LIST
AAZK FORMS (Animal Data Transfer, Exhibit Design)

Evening - 6:00 p.m. to 10:00 p.m.

(6:00 to 7:30 p.m. meeting will adjourn for dinner)

ZOO UNIVERSITY PROJECT
PROGRAM LIBRARY
AAZK ACCESSORIES - KC buttons, stickers, coffee mugs,
baseball caps, belt buckles, license
plates, T-shirts
ZOO KEEPER HUSBANDRY FUNDAMENTALS
VIDEO TAPE PROJECT
HANDBOOK OF MOTHER-REARED INFANTS
KEEPER TRAINING MATERIALS
IDENTIFICATION PROJECT

Note: Further discussion following dinner from 8:00-10:00 p.m. (if needed)

OPEN NATIONAL BOARD MEETING

Sunday, 11 September, 1988 --- Board meeting open to all delegates

Morning - 8:00 a.m. to 12:00 noon

Proposed Agenda: NATIONAL HEADQUARTERS
ANIMAL KEEPERS' FORUM
AAZK PUBLICATIONS - Directory, Zoonoses, Biological
Values, Career & Membership
Brochures, Diet Notebook and
Handbook of Mother-Reared
Infants
AAZK FORMS - ADT & Exhibit Design
AAZK ACCESSORIES - KC Buttons, stickers, coffee
mugs, baseball caps, license plates, belt
buckles, T-shirts;
VIDEO TAPE PROJECT
PROGRAM LIBRARY
ZOO UNIVERSITY PROJECT

From the President, *Continued*

KEEPER TRAINING MATERIALS
IDENTIFICATION PROJECT
LIBRARY RESOURCES
REFERENCE SEARCH

Afternoon - 12:00 noon to 6:00 p.m.

(12:00-1:00 p.m. meeting will adjourn for lunch)

BY-LAWS REVIEW
KEEPER ACCOMMODATIONS LIST
STAFF EXCHANGE
BOOK REVIEWS
LEGISLATIVE ADVISOR
KEEPER EDUCATION COMMITTEE
ZOO KEEPER HUSBANDRY FUNDAMENTALS
PUBLIC EDUCATION COMMITTEE
PUBLIC RELATIONS LIAISON
AAZK LIAISON TO AAZPA & IZE
REGIONAL COORDINATOR CHAPTER SYSTEM
CHAPTER LIAISON PACKETS
INTERNATIONAL AFFAIRS COORDINATORS
RESEARCH/GRANTS COMMITTEE
NOMINATIONS/ELECTION COMMITTEE
AAZK HISTORY COMMITTEE
AWARDS COMMITTEE
ANNUAL CONFERENCES 1988-89, 1990 site/host
CONFERENCE BOOK COMMITTEE
PROPOSALS

Note: Further discussion following dinner from 8:00-10:00 p.m. (if needed)

Evening - 6:00 p.m. to 10:00 p.m.

(6:00 p.m. to 8:00 p.m. meeting will adjourn for dinner)

Any AAZK business not covered earlier will be discussed after dinner. We hope to complete all business over the two days listed here, but we may have to schedule special discussion groups throughout the conference week.

AAZK Welcomes New Professional Members

Randall C. Warren, Acadia Zool. Pk. (ME)	Thomas Clark, Acadia Zool. Pk. (ME)
Cindy Ambrosio, Van Saun Park Zoo (NJ)	Barry L. Stuart, Staten Island Zoo (NY)
Heather Thompson, Bronx Zoo (NY)	Nancy Wakeham, Bronx Zoo (NY)
Gloria J. Lessig, Catoctin Mountain Zoo (MD)	Brenda H. Morgan, National Zoo (DC)
Michael A. Dilley, Toledo Zoo (OH)	Jan Dourlet, Indianapolis Zoo (IN)
Kari Elsenpeter, Indianapolis Zoo (IN)	Randy McGill, Detroit Zoo (MI)
James Johnston, Minnesota Zool. Gdns. (MN)	Randi Kurka, Wildlife Ed. Found. (IL)
Susan G. Edwards, Brookfield Zoo (IL)	David Petacque, Lincoln Park (IL)
Kathleen Moore, Kansas City Zoo (MO)	Kathy Landry, Audubon Zoo (LA)
Jeff Vaccaro, Audubon Zoo (LA)	Staci Wood, Caldwell Zoo (TX)
Mary McFarland, Caldwell Zoo (TX)	Debra Cantrell, Caldwell Zoo (TX)
Scott Maddox, Caldwell Zoo (TX)	Andrew Silver, San Antonio Zoo (TX)
Sherryl Baccarella, Denver Zoo (CO)	Jane Larson, Hogle Zoo (UT)
Tino Arana, Tracy Aviary (UT)	Theresa Prator, Los Angeles Zoo (CA)
Jane Lawson, Arizona-Sonora Desert Museum (AZ)	Marcia Hawkins, Los Angeles Zoo (CA)
Joan Rice, San Diegffo Wild Animal Pk (CA)	Susan H. Euing, San Diego Zoo (CA)
Patricia Simonet, San Diego Wild Animal Pk (CA)	Scott Krueger, Santa Barbara Zoo (CA)
Dana W. Knepper, Fresno Zoo (CA)	Sylvain Ethier, Granby Zoo (Quebec)
Judy Morden, University of Alberta (CAN)	



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Coming Events

AZAD Annual Conference

September 9-12, 1988

Baltimore, MD

Association of Zoo and Aquarium Docents will be hosted by the National Aquarium in Baltimore and the Baltimore Zoological Society. For further information, contact: *AZAD Conference, Baltimore Zoo, Druid Hill Park, Baltimore, MD 21217-4599 (301) 576-3886.*

14th National AAZK Conference

September 11-15, 1988

Tucson, AZ

Hosted by the Tucson AAZK Chapter. Watch your *AKF* for registration forms, agenda details and announcements. For more information contact: *Ed Hansen or George Montgomery, Tucson Chapter AAZK, P.O. Box 43908, Tucson, AZ 85733-3908.*

8th Annual Conference of the Association of Zoological Horticulture

September 11-15, 1988

Tucson, AZ

Will include joint functions with AAZK National Conference delegates. Also separate sessions, Plant Sale, pre/post-conference tours. Registration fees: \$100 for Member; \$120 for Non-member; \$90 for spouse/children/guest. For further information contact: *George Montgomery or any other Plant Dept. staff member at the Arizona-Sonora Desert Museum. Phone: (602) 883-1380.*

AAZPA Annual Conference

September 25-29, 1988

Milwaukee, WI

Hosted by the Milwaukee County Zoo. For further information contact: *Kerry Bublitz, Public Relations & Advertising Coordinator, Milwaukee County Zoo, 10001 W. Bluemound Rd., Milwaukee, WI 53226.*

People, Animals and Environment: Exploring Our Interdependence

Sept. 29-Oct. 1, 1988

Orlando, FL

The 7th annual conference of the Delta Society. For further information contact: *Delta Society, P.O. Box 1080, Renton, WA 98057-1080.*

The Biennial Conference of the International Association of Zoo Educators

October 2-7, 1988

Toronto, Canada

To be held at Park Plaza Hotel, Toronto. The theme for the conference is "Communicating for Conservation". Featured at the meeting will be general papers, colloquium papers, workshop sessions, poster displays and moderated discussion groups. For further information, contact: *Merebeth Switzer, Metro Toronto Zoo, P.O. Box 280, West Hill, Ontario, Canada M1E 4R5.*

Coming Events. *Continued*

**The 5th World Conference on Breeding
Endangered Species in Captivity**

October 9-12, 1988

Cincinnati, OH

For further information contact: *Betsy Dresser, Director of Research, Cincinnati Zoo, 3400 Vine St., Cincinnati, OH 45220 (513) 281-4701.*

**The First International Symposium
on Spectacled Bears**

October 14-15, 1988

Chicago, IL

To be held at the Lincoln Park Zoo. Topics focusing on current field studies and captive management/reproduction of the spectacled bear will be highlighted. These include: captive management, demographics, reproduction in captivity, nutrition, vocalization and mother/infant behavior. For further information contact: *Mark Rosenthal, Curator of Mammals, Lincoln Park Zoo, 2200 N. Cannon Drive, Chicago, IL 60614, (312) 294-4660.*

IMATA 16th Annual Conference

Oct. 30-Nov.4, 1988

San Antonio, TX

Meeting of the International Marine Animal Trainers Association. For further details contact: *Ken Ramirez, IMATA Vice-Pres., Entertainment Plus, 6608 Stewart Road, Suite 169, Galveston, TX 77551 (409) 744-0938.*

**Association of Zoo Veterinary Technicians
Eighth Annual Conference**

Nov. 4-6, 1988

Toronto, Canada

To be held at the Hotel Sheraton Centre. Topics will include: handrearing the infant orangutan; reproductive research in embryo transfer; and reptile medicine, including anaesthesia of venomous snakes. Registration fee of \$100 includes attendance to all presentations, luncheons, and banquet dinner. A copy of conference proceedings, as well as local transportation are also provided. For information, contact: *AZVT Vice-President, Virginia Crossett, Louisville Zoo, P.O. Box 32750, Louisville, KY 40233 or call (502) 459-2181.*

NOTICE: The Scholl Conference on the Nutrition of Captive Wild Animals will not be held in 1988. The next Nutrition Conference will be held in late 1989 at the Lincoln Park Zoo. Any persons interested in submitting papers for the 1989 conference should contact: *Dr. Thomas P. Meehan, Lincoln Park Zoo, 2200 N. Cannon Dr., Chicago, IL 60614 (312) 294-4689.*

NOTICE: The 1988 Elephant Conference will not be held at Marine World Africa USA, Vallejo, CA. Official notice will be posted if a future date is selected in the years to come.



Births & Hatchings



Los Angeles Zoo AAZK Chapter...reports the following significant births and hatchings for the months of April through June 1988. Hoofstock: 1.0 Axis deer, 2.1 Nyala, 2.1 Arabian oryx, 3.0 Gerenuk, 1.7 Nubian ibex, 1.2 Desert bighorn sheep, 0.1 Grevy's zebra (our 1st of this zebra species), 0.0.1 Chamois, 0.0.3 Rocky Mountain goat, 3.4.1 Markhor and 1.0 Dall sheep. Primates: 0.0.1 Black howler, 1.1.4 Cottontop tamarin, 0.0.1 Ring-tailed lemur, 0.0.2 Golden lion tamarin, 0.0.2 Emperor tamarin, 0.0.1 Celebes crested macaque, and 3.0 Red-ruffed lemur. Australia: 2.0 Squirrel glider and 0.0.1 Southern koala. Mammals: 0.0.1 Caracal, 0.0.1 Cape hyrax, 0.0.1 Meerkat (our 1st of this species), 1.0 Central American tapir, and 2.1 Wart hog (this is our fourth litter born, with this birth being the first litter for our new Moscow pair). Reptiles: 0.0.2 Leopard gecko, 0.0.1 Prehensile-tailed skink, 0.0.7 Uracoan rattlesnake, 0.0.5 Urutu, 0.0.6 Jamacian boa and 0.0.23 Reticulated python. *submitted by Kim Brinkley, Chapter Liaison, Los Angeles Zoo AAZK Chapter.*

Santa Ana Zoo...births for the past 11 months include: 1.0 Celebes crested macaque, 3 Patagonian cavy, 2.0 Black-cap capuchin (*apella* sub-species), and 1.1 Red-handed tamarin. Acquisitions during this period included 1.0 Collared aracari, 1.0 Alpaca, 1.1 Toco toucan, 50 Sulcated tortoise (confiscations/ultimately returned to importer), 1.1 Salmon-crested cockatoo, 1.0 White cockatoo, 1 Bell's horned frog, 0.2 Pygmy hedgehog tenrec, 8 Blue and Gold macaw, 6 Greenwing macaw, 1.1 Thick-bellied parrot, 0.1 African hedgehog, 0.1 Crested wood partridge and 1.1 non-releasable Bald eagles. *submitted by Connie Sweet, Curator, Santa Ana Zoo, Santa Ana, CA.*

Burnet Park Zoo...the Burnet Park Zoo, Syracuse, NY, reports the following notable births and hatchings from November 1987 through June 1988. In the Small Mammal Dept. our first captive-born Hoffman's sloth (*Choloepus hoffmanni*) (b. June 1985) gave birth to a female on 4 November 1987. Ten days later a male was born and in January another female was born. These births bring our Hoffman's sloth colony up to 3.10 individuals. Our Egyptian fruit bat (*Rousettus aegypticus*) colony successfully produced three babies of which only one needed to be hand-raised. Our primate collection has grown with the addition of 0.2 White-handed gibbons (*Hylobates lar*) and 1.1 Japanese macaque (*Macaca fuscata*). Our Meerkats (*Suricata suricata*) are presently raising their third litter of three in the exhibit. We have found that papering the windows at the first sign of birth helps to minimize cannibalism. And our pair of Blue duiker (*Cephalophus monticola*) have produced their second offspring, a female born on Easter.

The Reptile and Amphibian Dept. had 0.0.2 Redfoot tortoise (*Geochelone carbonaria*) and 0.0.2 Brown basilisk (*Basiliscus vittatus*) hatch. They have also successfully metamorphosed 0.0.10 (3 DNS) *Dendrobates auratus* and 0.0.1 *Dendrobates tinctorius*.

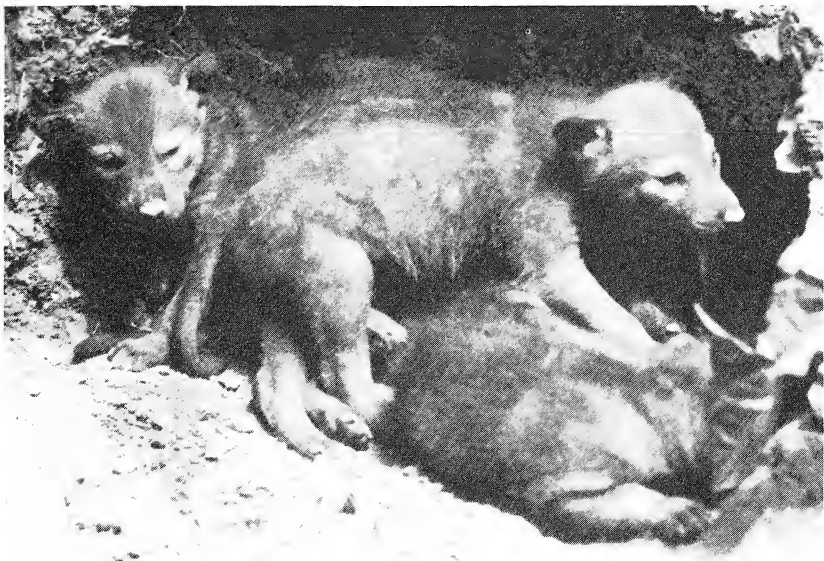
Our aviary was again the site for the successful brooding and raising of three Burrowing owl (*Speotyto cunicularia*) which emerged from the burrow in mid-April. Our education volunteers carried out an excellent behavioral study of adult Blue-crowned motmots (*Momotus momota*) feeding nestlings and were rewarded with the emergence of three fledglings on 25 June 1988.

Our domestic barn, which is trying to slowly change over to all minor breeds, had a female Tunis Sheep born in late February.

Births & Hatchings, Continued

Most importantly, on 18 May the zoo's Wild North area had its first birth of the endangered Red Wolf (*Canis rufus gregoryi*). Our pair produced a litter of 2.2 pups, all of which are doing well. This is an important first birth for our zoo, which participates in the SSP program for this rare canid (see photo).

Also in June, the zoo had its first birth of Pronghorn antelope (*Antilocapra americana*). Twin fawns (1.1; 1.0 DNS) were born on 23 June and others are expected shortly. Rounding out other births in the area were 0.3 Rocky mountain goat, 1.0 Bighorn sheep, 1.0 American bison, 2.1 Reindeer and 1.1 American red fox. *submitted by Krista Boyd Larrow, Burnet Park Zoo AAZK Chapter Secretary, Syracuse, NY.*



2.2 Red Wolf pups (*Canis rufus gregoryi*) born at the Burnet Park Zoo, Syracuse, NY on 18 May 1988.

Greater Baton Rouge Zoo...spring and early summer have been very busy at the Greater Baton Rouge Zoo. The Bird Dept. has had several significant hatchings including 0.0.2 Black palm cockatoo and 0.0.4 White-bellied stork. Both palm cockatoo (hatched 12 May and 21 June 1988) are being hand-raised and seem to be doing fine.

The white-bellied storks nested last year, but failed to successfully complete incubation. This year, the first two eggs were pulled and the second two were left with the parents. All four eggs hatched; two chicks were hand-raised and the parents raised the other two.

Already hatched are two Chilean flamingo chicks and several more eggs are being incubated in the colony nests. Also nesting this year are several pairs of Roseate spoonbills that were collected as fledglings from a rookery in southwest Louisiana. We collected spoonbills at the same time for several other zoos, and would be interested to hear from any zoos where they have begun to nest. Those currently nesting are the birds collected in 1985.

The Hoofstock Dept has had many notable births also. These include 3.0 Barasingha deer (1 DNS), 1.0 Uganda kob, 1.2 Impala, 2.0 Sable antelope, 1.1 Reeve's muntjac, 2.0 Bay duiker, 0.1 Nile lechwe (see photo), 1.0 Besia oryx, 2.0 Springbok, and 1.1 Grant's gazelle.

Births & Hatchings, Continued

Primate keepers were relieved at the successful birth of a Greater spotted guenon. The 20-year-old wild-caught mother gave birth by Cesarean last year and later lost the baby. This year she was able to successfully deliver the baby herself and mother and baby both appear healthy and strong. The baby was born 8 May 1988. *submitted by Linda Sanders, Head Keeper, Greater Baton Rouge Zoo, Baker, LA.*



Ear-tagging of 0.1 Nile Lechwe born at the Greater Baton Rouge Zoo in Baker, LA.
(Photo by Linda Sanders)

North Carolina Chapter AAZK...reports notable births and hatchings for April through June 1988 from each participating institution.

Duke Primate Center...7.5 Bushbabies (*Galagos*) of three species; 2.2.2 Lorises of two species and 19.19.4 Lemurs of 13 species. *submitted by Ruby Ange, Duke Primate Center, Durham, NC.*

North Carolina Zoological Park...out of 32 births occurring from April through June the following notable births are listed. On our 30-acre plains exhibit, 2.2 Nyala (0.1 DNS), 2.0 Blesbok and 0.1 Gemsbok were born. Other births included 0.0.6 Meerkat (3 DNS), 0.0.5 Rock hyrax (3 DNS) and 1.0 Gerenuk. The R.J. Reynolds Forest Aviary had a successful three-month period of hatchings. Adding to our already reported three hatchings of African spoonbills, 0.0.2 more were hatched. In addition to our first hatching record in the U.S. of 0.0.3 Pied barbets last fall, 0.0.4 more were hatched. The Aviary can also boast of another first hatchings in the U.S. of 0.0.2 Red-faced liocichla. Other successful hatchings include 0.0.1 Black naped fruit dove, 0.0.1 Victoria crowned pigeon, 0.0.4 Palawan peacock pheasant and 0.0.2 Black korhaans. *submitted by Lucy Segerson, Secretary, North Carolina Chapter AAZK, Asheboro, NC.*

Tampa/Busch Gardens...among the B&H reported for June were: 5.10 Impala, 1.0 Roan antelope, 0.1 Grant's zebra, 1.0 Black-backed (Bay) duiker, 1.0 White-handed gibbon, 0.3 Grant's gazelle, 5.5 Nyala, 0.0.2 Guinea (Western) baboon, 1.0 Soemmering's gazelle, 0.2 Greater kudu, 0.1 Scimitar-horned oryx, 2.0 Grevy's zebra, 1.0 Uganda kob, 0.1 Thomson's gazelle, 0.0.1 Capuchin, 0.0.1 White-bearded gnu, 0.0.13 Blue and gold macaw, 0.0.1 Lesser sulphur-crested cockatoo, 0.0.3 Scarlet macaw, 0.0.4 Golden (Queen of Bavaria) conure,

Births & Hatchings, Continued

0.0.1 Hahn's macaw, 0.0.1 Sun conure, 0.0.8 Lesser Bahama pintail, 0.0.9 American flamingo, 0.0.2 Gold-capped conure, 0.0.2 Violet-necked lory, 0.0.1 Black-capped lory, 0.0.1 Medium sulphur-crested cockatoo, 0.0.2 Red-fronted macaw, 0.0.9 Red-billed tree duck and 0.1 Severe macaw. submitted by Mary Eisenacher, Animal Records, Busch Gardens, Tampa, FL.

Bronx Zoo Chapter...announces the following significant B&H for June 1988. The Dept. of Mammology proudly announces the birth on 7 June of 0.0.3 Snow leopards (*Panthera unica*). This highly endangered species, almost extinct in nature, is doing well at the Bronx Zoo with more than 40 having been born here. The newest cubs may be seen in their recently completed habitat, Himalayan Highlands. The Bronx Zoo actively participates in the SSP Program for this species, and others of the beautiful but shy nocturnal cats have been sent to zoos around the world. 1.3.1 Formosan sika deer (*Cervus nippon taiouanus*) born in June are another extremely endangered species. The Bronx Zoo maintains one of the major breeding programs for them in the country. These delicate deer are one of the few species of Cervidae to retain their spots year round. On 8 June, a female Barasingha (*Cervus duvauceli*) was born; this species of deer is also endangered and protected by CITES.

Also born in June were 2.0.1 Przewalski horses (*Equus przewalskii*). These animals are known only in captivity and are considered nature's only true wild horses. They are part of an SSP program and the Bronx Zoo has a breeding group of 12 mares and 5 stallions. The future holds the hope of reintroducing herds of this horse to its former home in the steppes of Mongolia. Another ungulate that is SSP-designated is the Gaur (*Bovis gaurus*). The Bronx Zoo's collection increased by one gaur on 16 June with the birth of a male.

The Dept. of Ornithology hatched 0.0.2 Hooded crane (*Grus monacha*) on 6 and 7 June. Cranes are long-lived in captivity (between 20-60 years) and are believed to mate for life. Their dramatic courtship dances are a thrill to see and the Bronx Zoo hopes to build a habitat to house them in public viewing areas, as they are currently breeding in an off-exhibit section. On 30 June 0.0.2 American flamingo (*Phoenicopterus ruber ruber*) hatched out. The Zoo's flock of these spectacular pink birds is steadily increasing. Although flamingos may have nested at one time in the Florida Keys, they are now rare visitors to the States. Breeding colonies of American flamingos are found in the Bahamas, West Indies, Yucatan, Galapagos Islands and South America. 0.0.4 Temminck's tragopan (*Tragopan temminckii*) were hatched in June. These interesting birds can be seen adjacent to the Snow leopard cubs in the Himalayan Highlands. Our collection of Malayan peacock pheasants (*Polyplectron malacense malacense*) continues to grow with the hatching of one more on 25 June. submitted by Wendy Worth, Corresponding Secretary, Bronx Zoo Chapter AAZK, Bronx, NY.

Audubon Park & Zoological Gardens...the notable births and hatchings for this year include: Bird Dept - for the third year our Hyacinth macaw (*Anodorhynchus hyacinthinus*) pair have produced young. These birds are housed off-exhibit. This is the first year they have raised two chicks. The Rhino hornbills (*Buceros rhinoceros*) had 0.0.2 chicks this year, however one died the day it fledged. It's interesting that last year's male offspring was left in the group and has helped with feeding this year's chick. Our wrinkled hornbill pair (*Aceros corrugatus*) has 0.0.2 chicks. This pair has been in their off-exhibit enclosure for about nine months and this is their first attempt at nesting. Three eggs were laid and two hatched. The nest log has a removable panel at the back for monitoring eggs and young. This is the first time, to our knowledge, wrinkled hornbills have been bred in captivity. Also of note are 0.0.10 American flamingos (*Phoenicopterus ruber*) and 0.0.3 Black swans (*Cygnus atratus*).

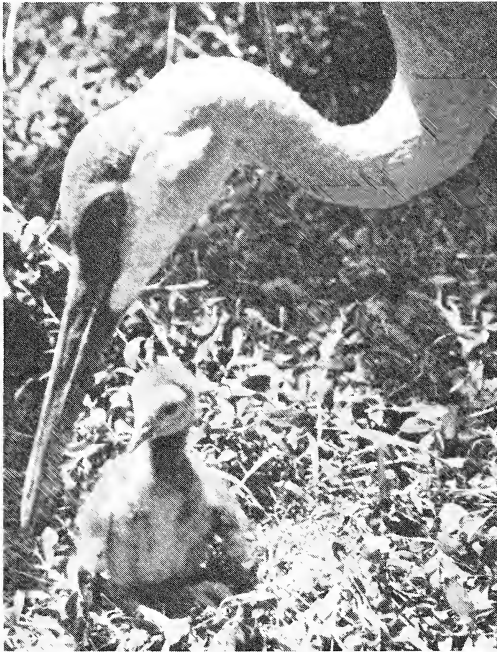
Mammal Dept: 2.2 Red wolves (*Canus rufus*) were born this spring. The adult male only bred one of our two females, however the other female is helping to care for the pups. 1.1 Talapoin monkey (*Cercopithecus talapoin*) were born. The female had to be hand-raised

Births & Hatchings, *Continued*

due to maternal neglect. She is now being reintroduced to the group and so far all is going well. 1.0 Giraffe (*Giraffa camelopardalis*) was born and three Bat-eared foxes (*Otocyon megalotis*) (DNS). submitted by Carolyn Kennedy, Chapter Liaison, Audubon Park Zoo AAZK Chapter, New Orleans, LA.

Henry Doorly Zoo...an artificial insemination project started in May at the Henry Doorly Zoo (Omaha, NE) has proven successful with the hatching of two Florida sandhill cranes (*Grus canadensis pratensis*). On 5 May, 1988 the project began with 2.2 cranes. The two males are highly imprinted on humans and the two females have formed a strong homosexual pair bond. The project lasted three weeks, in which time one female laid three eggs and the other two eggs. Of the three eggs from the first female, two hatched 9 June and 16 June respectively. The two eggs from the second female were infertile. The two females are housed together and are presently raising the chick hatched on 9 June (see photo) . The second chick is being puppet-raised by the Bird Dept. In the future, it is hoped we can use these procedures again on other birds with captive breeding problems.

Mammal births since April include the birth of twin Sable antelope (*Hippotragus niger niger*) on 31 May. The 1.1 calves are the first for Omaha. 3.0 Sable antelope calves were born in June. 1.3 Addax (*Addax nasomaculatus*) and 0.0.2 Senegal bushbabies (*Galago senegalensis*) were also reported. submitted by Carla Wieser, Keeper Apes/Pachyderms, Henry Doorly Zoo, Omaha, NE. (Note: the photo of the triplet polar bear cubs published in the June issue was taken by Mike Junior)



Florida sandhill crane chick hatched on 9 June at the Henry Doorly Zoo, Omaha, NE. The chick is being raised by the females cranes. (Photo: Randy Wisthoff)



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- Send application forms.
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Book Review

Animal Liberation, A New Ethics for Our Treatment of Animals

By Peter Singer

Avon Books, New York, N.Y., 1975

Paperback, 300 pages, \$4.00

*Review By Donna J. Robb
Former Keeper, Cleveland Zoo
Current biology student at
Case Western Reserve Univ.,
Cleveland, OH*

Why am I reviewing a book that first appeared in 1975? Because I just reread *Animal Liberation*, and I find it a must-read for anyone who cares about animals, world hunger, ethics, or life in general. Peter Singer's message rings as true now as it did 13 years ago since too little has changed in the way we treat animals. Singer researches factory farming, vegetarianism, and scientific experimentation.

If you have never heard of this book, it's because it was, and still is generally considered to be too radical for the general public. Singer promotes vegetarianism and an end to world hunger. He accuses most of us of having an attitude of speciesism, "a prejudice or attitude of bias toward the interests of members of one's own species and against those members of other species". Singer's arguments against speciesism are the same as those against racism or sexism.

Put a copy of *Animal Liberation* on your coffee table, and it will surely generate many stimulating conversations! I should warn the weak of heart and stomach that Singer's discussion of laboratory animals and factory farming may be too wrenching. But, his intellectual presentation is superb. The first page of the book says: "This book challenges the barriers that we have used to separate ourselves from the rest of the earth's inhabitants." As professional animal keepers, we should definitely explore Peter Singer's discussion of a "new ethics" for ourselves and for animals everywhere.

Note: If you are unable to locate a copy of *Animal Liberation* at your local library, write to:

PETA, P.O. Box 42516, Washington, DC 20077



CONFERENCE '88

NOTES & REMINDERS



Just another reminder from the Tucson Chapter/AAZK. The weather in Tucson in early September is very predictable. It will be hot. Probably VERY hot. Daytime temperatures will be in the 95 degree range with morning lows around 70 degrees. The monsoon season, which usually hits Tucson from July 4th until August, brings intense thunderstorms that dump copious quantities of moisture upon the population and desert vegetation. It has only rained in the second week of September once in the last decade. So bring your raingear! Just kidding! But do bring your sun screen. If you plan on spending more than 20 minutes outside, you will need a good quality sunblock. Over-exposure to the Arizona sun will make your conference stay a miserable experience. We sincerely want you to take advantage of all the educational and fun activities that we have provided for you.

Fluid consumption is a must. NON-ALCOHOLIC beverages (water) should be consumed often, especially during field trips. (The hospitality room is exempt from this rule of sanity, because obviously the sun has set.)

TUCSON, IT'S GONNA BE HOT - STAY HYDRATED

* * * * *

Now that you are "sun conscious", bring your swimwear and flippers for the Wednesday afternoon POOL PARTY. Free time is scheduled after lunch until 3:30 p.m. for your enjoyment. Swim, shop or just drop, it's your choice. El Con Mall is within walking distance for your shopping pleasure. Or just use this time to take a "mid-conference break". We do have plans for you beginning at 3:30 p.m.

* * * * *

IMPORTANT NOTE: The deadline for Post-Conference trip registration has been extended to 15 August. These trips include the Phoenix Zoo/Wildlife World visit and The Grand Canyon tour. Pre-registration is necessary as you will not be guaranteed a space if you do not pre-register. See details on both trips in the gold insert of the June AKF.

* * * * *

Complimentary transportation from the Airport to the Doubletree Resort Hotel will be provided on Saturday from early morning until 8:00 p.m. and on Sunday from early morning until 6:30 p.m. If you are arriving after these scheduled times, Arizona Stage Coach will provide you with free transportation. Outside of the Continental/Eastern terminal just 50 feet to your right, you will find their booth. Identify yourself as an AAZK delegate and your destination as the Doubletree Resort Hotel.

* * * * *

Time constraints and the fact that the Tucson AAZK Chapter has planned your conference activities down to the microsecond has forced us to move the Australasian Rap Session to Tuesday evening at 7:30. This session was previously scheduled for Monday night, but to allow everyone an equal opportunity to exhibit their roaches at the 1st Annual Roach Contest, we decided to reschedule. Judy Steenberg will again be leading the session. Abstracts from the May 1988 Australian Mammal Society's Macropod Symposium will be available for review. Also samples of "Wombaroo Products" (milk supplements for marsupials), other items and data regarding the nutritional requirements for many species of marsupials according to the various stages of development will be shared at the Rap Session.

HOTEL RESERVATION REQUEST

1988 AAZK National Conference

11-15 September



DOUBLETREE HOTEL

TUCSON

445 S. Alvernon Way • Tucson, AZ 85711
(602) 881-4200

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Make your check payable to: DOUBLETREE RESORT HOTEL

ROOMS WILL BE HELD ONLY UNTIL 6:00 P.M. UNLESS GUARANTEED BY EITHER CREDIT CARD OR ONE NIGHT'S DEPOSIT.

	<u>DbL./DbL.</u>	<u>King</u>		<u>DbL./DbL.</u>
1 person	\$40.00	\$40.00	3 person	\$52.00
2 person	\$40.00	\$40.00	4 person	\$58.00

I will be sharing a room with: _____

Please make every effort to secure a roommate on your own. If you need assistance, or wish to place your name on a 'roommate list' contact the Tucson Chapter. We will try to match roommates, but we cannot guarantee your tastes will match ours.

RETURN THIS FORM TO:

CONFERENCE '88
Tucson Chapter/AAZK
P.O. Box 43908
Tucson, AZ 85733-3908

1988 AAZK NATIONAL CONFERENCE REGISTRATION
FORM

SEPTEMBER 11-15, 1988
Tucson, AZ

PLEASE TYPE OR PRINT (one name only per form please)

Name _____

Address _____

City _____ State/Province _____

Zip Code _____ Telephone # _____

Zoo Affiliation _____

AAZK Committee Member _____

Are you attending your first conference? Yes _____ No _____

Will be submitting a paper: Yes _____ No _____

(\$25.00 will be refunded from registration fee on acceptance of paper)

Participating in Zoolympics: Yes _____ No _____

Bringing an auction item: Yes _____ No _____ (describe briefly) _____

Vegetarian: Yes _____ No _____ (Specify type) _____

Are you interested in a conference T-Shirt? Yes _____ No _____ (S M L XL)

AAZK Membership status and fees:

Member/spouse	\$75.00 each (after 1 August 1988)
Non-member	\$90.00 each (after 1 August 1988)

Total fees enclosed \$ _____

Daily rates for individual events are available. Contact Ed Hansen for details.

Arrival date and time:

Complimentary transportation will be provided, please provide the above information ASAP.

PLEASE MAKE PAYMENT TO: TUCSON CHAPTER/AAZK

Return this form WITH YOUR FEE to: Tucson Chapter, AAZK, Conference '88, P.O. Box 43908, Tucson, AZ 85733-3908.

Tucson is rich in Mexican/American heritage and culture. A Spanish influence will be evident wherever you venture in the city. Whether it is the architecture, the unique art styles, or the wonderful food, the Tucson AAZK Chapter wants you to feel relaxed and welcome in the 'Old Pueblo'.

THE OFFICIAL AAZK SPANISH/ENGLISH TRANSLATIONS

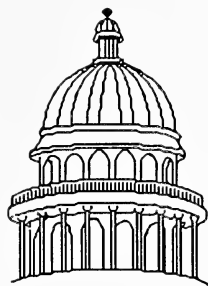
BIENVENDIOS	-	Welcome
POR FAVOR	-	please
GRACIAS	-	thank you
CERVAZA	-	BEER (very important)
TORTILLA	-	kinda like a crepe, only better
BURRO	-	(NOT AN ANIMAL) - any food item wrapped in a flour tortilla
CHIMICHNAGA	-	as above only deep fried
FRIOLES	-	fried beans
CERVAZA	-	BEER (very important)
TOSTADA	-	any items on a flat corn tortilla
CHILE VERDE	-	green chile
CHILE COLORADO	-	red chile
SALSA	-	spicy, hot, mild tomato sauce
ENCHILADA	-	items wrapped in a corn tortilla and covered with salsa
QUASADILLA	-	flour tortilla, topped with melted cheese (Mexican Pizza)
CHORIZO	-	Mexican spiced sausage
MAS CERVAZA	-	MORE BEER (very important)
BANOS	-	restrooms (you'll need these after the above)
HOMBRES	-	men
DAMAS	-	ladies
AGUA	-	water
CALIENTE	-	hot (very important)
MUCHO CALIENTE	-	very hot
FRIA	-	cold (hardly every used)
CERVAZA FRIA	-	cold beer (very important)
SIESTA	-	nap time
FIESTA	-	party time
POLICIA	-	hotel security
BUENOS DIAS	-	good day or good morning
BUENOS TARDES	-	good afternoon
BUENOS NOCHES	-	good night
ADIOS	-	good-bye

DONDE ESTA CONTESTA DE LA CUCARACHA? - Where is the Cockroach Contest?

Legislative Outlook

By

John Stoddard
AAZK Legislative Advisor
Brookfield Zoo, Brookfield, IL



Hearings on the Elephant Protection Act and on rhinoceros protection

On 22 June the House Subcommittee on Natural Resources, Agriculture, Research, and Environment held hearings on methods of protecting elephants and rhinos. Various witnesses were called to testify and offer their suggestions.

Witnesses at the rhino hearings included: Dr. Thomas J. Schneider, Rhino Rescue, USA; Dr. David Western, Chairman, IUCN African Elephant and Rhino Specialist Group; Dr. Esmond Bradley Martin, rhino trade specialist from Kenya; Dr. Willie Nduku, Director, Zimbabwe Department of National Parks and Wildlife Management; Dr. Ollie Ryder, San Diego Zoo; Dr. Thomas Foose, AAZPA; Dr. Eric Dinerstein, Visiting Scientist, Smithsonian Institution; Tony Dyer, ranch director from Kenya; and Christine Stevens, Animal Welfare Institute. In addition, Brian Carey, of the Armstrong Tire Co., discussed that company's involvement in rhino conservation.

The hearings were chaired by Congressman James H. Scheur of New York, who has a personal interest in rhinos. Chairman Scheur has made a commitment to put pressure on those countries involved in heavy rhino trade. He is starting on a trade mission to Europe in July and will discuss rhinos at his meetings there.

Dr. Western and Dr. Nduku also offered testimony at the elephant hearings. Other witnesses included: Ron Lambertson, Fish and Wildlife Service and Chairman of the CITES Standing Committee; Dr. Ian Douglas Hamilton, elephant biologist; Bill Reilly, World Wildlife Fund; and Dr. Sue Lieberman, Humane Society of the U.S.

The witnesses represented diverse points of view, and during the question and answer period there was an attempt to formulate a consensus bill. Such a bill would probably include a ban on ivory from non-CITES countries and from countries with no wild elephant populations. There was no agreement on how to handle ivory from intermediary countries. It is believed that an approach similar to this will be adopted by the Subcommittee. The bill is scheduled for a mark-up session in early August.

> *From AAZPA Legislation Committee*

FWS denies panda permit

On 20 June the Fish and Wildlife Service denied the Michigan Department of Natural Resources a permit to import a pair of giant pandas (*Ailuropoda melanoleuca*). The pandas were to be exhibited at the Michigan State Fair.

In explaining the decision, the FWS concluded that importing the two pandas would violate certain provisions of CITES and the Endangered Species Act. FWS further concluded that the funds generated by the exhibit that were to be paid to China for panda conservation might actually reduce the panda's chances for survival in the wild. The Michigan exhibit was expected to generate over \$300,000 for the Chinese panda conservation program, and FWS

Legislative Update, *Continued*

has learned that one of the planned uses for the funds in China, the expansion of a captive breeding facility, could accelerate removal of pandas from the wild. The agency also noted the potential risks to the animals or their reproductive capabilities during transport and introduction to a new facility. (The male, at almost seven years old, is believed to be sexually mature, and the female, at almost five years, should be soon if she is not already.) The proposed exhibit site, at a state fair rather than a zoo or research facility, also contributed to the agency's decision.

In a related item, AAZPA and World Wildlife Fund have filed suit in Federal District Court in Washington to prevent future short-term panda loans to the U.S. The suit also seeks a court order to seize two pandas currently on exhibit at the Toledo Zoo and return them to China. On 17 June the court granted a preliminary injunction preventing any fees from being collected from exhibiting the pandas.

> *From The New York Times (21 June 1988)*

Debt-for-nature swaps

One of the most innovative new concepts for conservation is the debt-for-nature, or debt-for-conservation, swap. Under this plan conservation organizations purchase, at a large discount, a portion of the debt owed by a Third World country. The debtor nation then "redeems" the debt by committing an equal amount of local currency or bonds to conservation efforts within the country. All of the parties involved benefit from these deals: the lender bank is relieved of some of its high-risk foreign debt holdings, the developing country is able to redeem some of its outstanding debt in local currency, and significant local resources are set aside for conservation.

Debt swaps first became possible when lender banks began selling Latin American debt—at a substantial discount—on the so-called "secondary debt" market in the U.S. This secondary market led to the development of debt/equity programs, whereby debtor nations redeemed a portion of their foreign debt in local currency. In exchange, foreign investors received equity in local businesses. The first of these swaps occurred in 1986 between Mexico and Nissan Motors. Debt-for-nature swaps grew out of these debt/equity programs.

The first debt-for-nature swap took place last year when the Weeden Foundation donated \$100,000 to Conservation International to buy \$650,000 of deeply discounted Bolivian debt. The debt was cancelled in return for a 3.7 million acre expansion of the Beni Reserve, an area that supports 12 of Bolivia's endangered species.

Last December, World Wildlife Fund purchased \$1 million of Ecuador's debt for \$354,000 from New York Citibank. Ecuador's central bank converted the debt into nine-year bonds which were transferred to Fundación Natura, the leading private conservation group in Ecuador. Interest from the bonds will be used to train local scientists and to establish and manage parks and preserves on seven million acres of the Andes, the Amazon, and the Galápagos Islands. WWF has also committed \$3 million over the next three years for debt-for-nature swaps in Costa Rica.

In a decision that bodes well for the future of debt-for-nature swaps, the Treasury Department has issued a ruling that facilitates commercial banks direct involvement. Lending banks can now take a deduction for the full face value of any debt that is donated for a swap even if it would sell for less on the secondary market.

Several bills have been introduced into Congress to promote debt-for-nature swaps but so far none have been passed. Certain provisions of H.R. 3010, the Tropical Forest Protection Act, including a debt-for-nature language, were incorporated into the Omnibus Reconciliation Bill that was passed last December. (H.R. 3010 was discussed in the January 1988 *AKF*.) The Treasury ruling outlined above was a direct result of the debt-for-nature provisions of the Omnibus Bill.

> *From AAZPA Legislation Committee and WWF Partners newsletter (Spring 1988)*



Insects plus Utopia Equal INSECTOPIA on Tama Zoo's 30th Anniversary

By
Yoshi. Yonetani
ZooDEL, Zoo Design & Education Lab
Kobe, Japan

Tama Zoological Park welcomed their significant 30th birthday ceremony this past May 5th, when it was also the holiday of Children's Day in our country. This zoo had been constructed under the management of Ueno Zoological Gardens, Tokyo Metropolitan Government, which is the oldest zoo in Japan. Its area of the site covers 52 ha, and its collection houses 2000 specimens of 200 species of mammals, birds, freshwater fish, reptiles and amphibians as well as about 50,000 insects of over 100 species which are displayed at their world famous Insectarium. On an average, 1.5 million people visit there annually.

They planned the new facility for insects as their anniversary memorial project and the Insect Ecological Land as a unique butterfly-shaped complex next to an old main hall of the Insectarium was opened to the public on 26 April, a little earlier than the anniversary date. As the goal of this program, they have five objects to follow, i.e.

- (1) As a facility for introduction of various kinds of insects and their own habitat.
- (2) For the exhibition by various techniques of the ecology and life-cycles of insects.
- (3) Providing a study area for a plentiful ecological education for visitors.
- (4) As a place to properly nurture children's perceptions of the wonder of insects.
- (5) Insure the harmonious form of its making the best use of climate without any damage of nature around those grounds.

This building is made up of three blocks mainly at the traces behind the former Butterfly Aviary and Orthoptera Farm which opened June 20, 1966 (they were closed after 20 years for construction). A big hothouse called Insectopia (meaning of Insects - Utopia) in the center is a walk-through style surrounded with lush tropical plants, stream, waterfall, cave, or rock terraces under the arch-shaped glass ceiling. It's the largest Butterfly Aviary in the world with about 600 specimens of 15 species! The left wing is a live display for exotic insects and the butterfly's life-pattern. The right wing is for orthoptera exhibits and the nocturnal insect house.

The scale of this insect house is shown below from data of their master-plan:

Entire floor area ... 2480 m²

Insectopia ... 1140 m²

Insect house for foreign produced species ... 35 m²

INSECTOPIA, *Continued*

Display area for the relations of Insectivora (insects & plants) ... 43 m²

A hothouse for rearing of butterflies ... 256 m²

Display corner for grasshoppers & other insects ... 73 m²

Nursery for grasshoppers & other insects ... 210 m²

Nocturnal insect house ... 47 m²

Service Area (entrance hall, passway, etc.) ... 505 m²

Background area (mechanic room, elevator for handicapped persons) ... 171 m²

The average height of this building is 9.4 m and it's 16 m high at the top of the ceiling.

See accompanying Illustration # 1 for these layouts:

1. Introduction (entrance & exit, information)

2. Exotic insect house including luminous insects (*Bolitophilidae*) such as the glowworm (*Arachnocampa richardasae*) from New South Wales on the mainland of Australia and *A. tasmaniensis* from the Island of Tasmania.

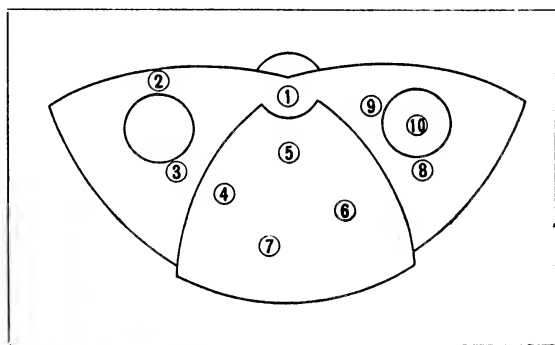


図1 新温室群の観覧順路 Visitor's Routing

3. Exhibit-theme/Metamorphosis, insectivorous plants

4. Insectopia/ first part:

-free-ranging butterflies/ecological site for a firefly

5. /2nd part:

-aquatic insects in running water (stream) & insects underground

6. /3rd part:

-aquatic insects in pond and marsh

7. /4th part:

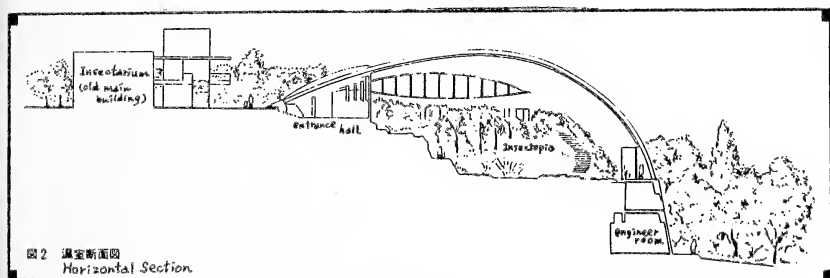
-a field at lower level about 8 m down from entrance zone for encountering butterflies and dragonflies or similar field-work space

INSECTOPIA, *Continued*

8. Orthoptera exhibits with familiar insects like a beetle, a grasshopper, and in the near future the addition of a contact corner for insects.
9. Nocturnal insect house with arthropods like a scorpion, a tarantula, or a variation of firefly.
10. Court for the open-air lecture area (for example: schooling, Zoo's events) of the natural sciences.

The Zoo's Director, Mr. Minoru Yajima, is a well-known entomologist and his staff includes experts in the care of insects. Two staff members were dispatched to Australia last December for collecting specimens and introducing them into their new exhibits. It was an exceptional case in Japanese Zoo's world. They collected two species of bulldog ants (*Myrmecia farsata* and *M. nigrocincta*) as well as the above-mentioned glowworms. The Insectarium's main hall still remains. The first floor contains a nocturnal room with 10 cases displaying insectivorous animals such as the bat, bushbaby and armadillo. The upper floor is used for an exhibition area featuring Japanese insects and the others, a mounted specimen gallery (like a small Insect Museum), and an auditorium.

This great achievement brought about the completion of Insect Ecological Land (Insectopia) and was realized 107 years after the opening of the first Insect House to exhibit living insects at the London Zoo in 1881.



Information Please

Information is requested concerning abnormal coloration in Congo African Grey Parrots (*Psittacus erithacus erithacus*) and Timnea Grey Parrots (*Psittacus erithacus timnea*). Information on diet, housing, and general care would be appreciated. Please respond to: Sam Mancuso, 2551 E. Gore Rd., Erie, PA 16510.



The following information may be of interest to other keepers: 1.1 adult Thomson's gazelle (*Gazella thomsonii*) were killed by two or more Coyotes (*Canis latrans*). The male gazelle was so aggressive that he dominated the adult male Common waterbuck (*Kobus ellipsiprymnus*) which shared the African Veldt exhibit with him. submitted by Cynthia Topp, Keeper, Phoenix Zoo, Phoenix, AZ.



VIEWPOINT

A Response to the May '88 "Viewpoint: The Eclectic Keeper"

By
Mark L. Hofling, President
Bronx Zoo Chapter AAZK
Bronx Zoo, Bronx, NY

I have been a member of AAZK for five years and I am now President of our local Chapter. It is my view that AAZK has made great strides in "professionalizing" zookeeping in the last twenty-plus years and it is becoming stronger all the time. The local Chapters have been an integral part of this change for the better. Zookeepers are by nature "eclectic"; we constantly look to other professionals for information so that we may give the best possible care to the animals in our charge. This exchange of ideas is part of the foundation of AAZK and its local Chapters. In my opinion there is nothing provincial about our being.

According to Kevin T. Patton ("Viewpoint, May *AKF* '88), his local Chapter holds its regular meetings in the cafeteria during lunch. This seems to be a great way to get a Chapter off the ground. I am familiar with that Chapter and, for the record, it just received its charter earlier this spring and the keepers there should be congratulated for that accomplishment. It is difficult and time consuming enough to keep an established Chapter viable and I am sure it is much more so to start one. Fortunately the keepers at the St. Louis Zoo are dedicated enough to make a go of it. It is my understanding that the local Chapters should, and from what I have seen do, welcome other interested persons who are not zookeepers. But the fact of the matter is that we are an organization of zookeepers!

When attempting to start or expand a Chapter we must first get the support and backing of our fellow zookeepers or run the risk of alienating them, thus eroding our very foundation. A Chapter made up, for example, of ten zookeepers and thirty or forty interested persons would not serve its purpose. Doubling or tripling a Chapter's size may be nice, but not if the zookeepers become a minority.

Let me now address Mr. Patton's "practical suggestions". To those people who work with animals outside of a zoo who wish to become a part of AAZK, they need only show a little professional interest. Our Chapter, as is the national association, is dedicated to professional animal care and conservation. If a circus trainer or animal talent agency worker wrote to our Chapter expressing interest I would welcome them even though I am strongly opposed to the exploitation of animals, especially for profit. For colleges/universities the doors are always open to those who wish to make a positive difference. Another of Mr. Patton's suggestions was to track down a circus attendant. First of all, a circus atmosphere is not one which many zoos wish to project. I doubt that there is much beyond muzzling bears or extracting canine teeth from baboons that they could show us, but they are welcome to approach us when they need to know how to maintain an endangered species in a captive breeding program. Mr. Patton's suggestion to invite professors/students of local colleges to share their research is often handled through zoo's education or research departments. Should, however, someone in academia be working on a project related to captive management or wildlife conservation it might be appropriate to set up a lecture or meeting.

When a student at St. Louis University, I wrote to the zoo and spoke with the curators asking how I could be of help. I knew full well that it was they who were helping me. Mr. Patton's suggestion to invite a pet dealer really floored me. The pet trade is largely responsible for the decline of many species in nature, particularly psittacines. But maybe I could find a way to accept someone who works with animals for profit and not for the love of animals

VIEWPOINT. *Continued*

themselves. Mr. Patton's suggestion to "assess your local Chapter's policies and practices in light of possible exclusion of non-zoo employees" may be valid, but let's remember that we are an organization of zookeepers. Our Chapter welcomes non-zoo employees who have shown professional interest. I am sure that once established, any Chapter would be open to such individuals provided they did not try to dominate Chapter affairs.

Mr. Patton closes by asking the question: "Why not throw everything together and choose only the best?" It is my belief that one should start on firm ground rather than on shifting soil.

I wish to thank the editors of AKF for providing me this opportunity to express my viewpoint.



Meet Your Regional Coordinators

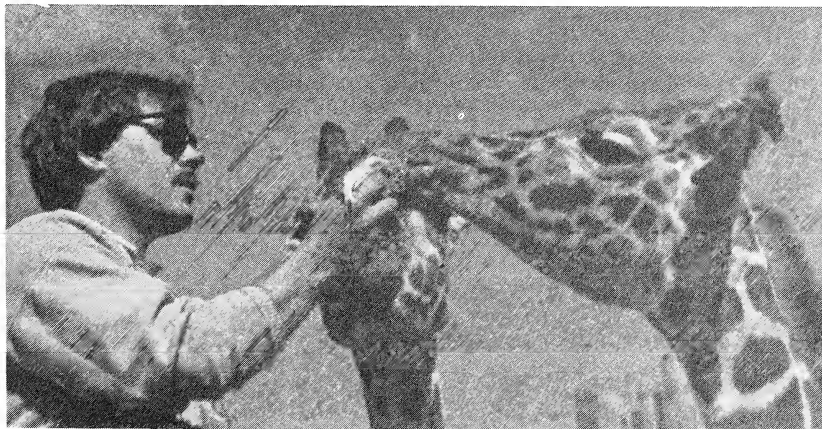
**Steve Tigges, Tulsa Zoo
RC for OK, NE, KS, ND, SD**

'Zoo Who to Zookeeper to Zooz Brothers'

The road has been long and rough at times, but to be able to do what one has always dreamt of is really the reward in life.

Growing up in the city of St. Louis gave me the opportunity to interact with exotic animals at an early age. Fortunately, my parents knew what would pacify me...a weekly visit to the St. Louis Zoo and joining every zoo activity, such as the "Zoo Who's". I've always remembered those animal classes and the tours I took at such an early age. That's what got me on the path to my destiny.

Although different paths entered my life along the way, such as playing professional soccer and a four-year stint in the Army, I was always drawn back to the animal field. Even while on the road, playing for the St. Louis Stars, a former North American Soccer League team, I always visited the zoo in the city in which we were playing. During my stint as a member of the U.S. Army, I was fortunate to be able to travel to foreign countries. My free time would always be spent seeking out animal parks and zoos.



Meet Your RC's: Steve Tigges, *Continued*

Once my military obligation was up, I decided to attend Southwest Missouri State University and major in Wildlife Management. During college, my interest in animal behavior and research grew and the more I learned, the more passion I developed for the zoo field.

Finally, after many applications and interviews, my career door opened. The Tulsa Zoo hired me as the Swing Keeper for Primates, Reptiles and Small Mammals. Over the next two years I learned alot, although I yearned for specialization. That door opened when I transferred to the African Savannah area. I finally found my true love, Ungulates. Yes, it's a messy job, but someone's got to do it.

The one thing in this field I never imagined was me, at age 30, lip-syncing to a bunch of 50's and 60's songs. But the Zooz Brothers have brought a positive awareness to the Tulsa Zoo. With almost thirty performances under our belts and "of course" a Hollywood gig, we've had a lot of fun doing it.

AAZK has really been an invaluable friend to me in this field. It has so much to offer all of us. With the Diet Notebook in progress and the printing of Biological Values I and II, AAZK conferences and the many committees AAZK has to offer, it makes me proud to know that I devote my time to such a worthwhile organization. If there is any message or advice I could give, it would be that you only get out of something what you put into it. So put your support into AAZK and remember it's your organization. Welcome to it.

---Steve Tigges



Wisconsin Regional Primate Center's Audiovisual Services

(Editor's note: The following is reprinted from the Primate Library Report: Audio-visual Acquisitions" (No. 6, December, 1987) published by the Wisconsin Regional Primate Research Center, Madison, WI. It is reprinted here with the permission of the Center's Director, Dr. Robert W. Goy.)

The purpose of WRPRC's Audiovisual Service is to collect and make available non-print resources which relate to nonhuman primates. These are loaned in support of primate conservation efforts and for educational and research purposes to scientists and educators in the United States and abroad. The collection, which includes 3,500 slides, slide sets, videotapes, posters, and audiotapes, focuses on material on all living and fossil primates, primatologists, primate facilities, zoos, and other discipline-related ephemera. Both commercially produced and unedited materials e.g., rough videotaped data, are included. All materials are catalogued and computer-based searches are available on request. The database is enhanced with items available from a wide range of sources.

How to Borrow From the Collection:

Demand for use of materials in the library is heavy and so you are advised to make your requests as soon as possible before the time you wish to use the materials. Items available for loan are published in two sources: the bimonthly *Primate Library Report: Print Acquisitions*, and the semiannual *Primate Library Report: Audiovisual Acquisitions*. For a sample copy of either of the above, or more information contact: Larry Jacobsen, Primate Center Library, Wisconsin Regional Primate Research Center, 1223 Capitol Court, Madison, WI 53715-1299 (608) 263-3512.

WRPRC's Audio-Visual Library, *Continued*

Within the computerized database, items are retrievable by family, genus, species, common name, sex, age, captive or noncaptive status, and subject. Some searches or loan transactions may be subject to a service fee, which is worked out with the borrower in advance.

Can You Supply?

Since the WRPRC Audiovisual Service includes both commercially produced as well as unedited materials, they are interested in video or audio materials gathered in conjunction with behavioral research on primates. These materials--which can be stored as data archives--may be reused for other related research applications. They are particularly interested in videotapes, films, or slides which show any or all of the following: (1) pelage or other taxonomic features; (2) sexual dimorphism; (3) social and/or family groupings; (4) behaviors, e.g. sexual, play, feeding; (5) facial expressions; (6) habitat; and (7) aging and growth-related changes. They are interested in a broad range of materials for each species.

Listed below are species for which the Library has no videotapes or slides. If you can assist in locating materials for these species, write or call Larry Jacobsen at the address and number listed above. The Library would borrow the item(s) for two weeks, make copies for the collection and return the originals to you. Unless you otherwise specify, copyright remains with the originator of the piece.

Scientific name

Common Name

<i>Allenopithecus nigroviridis</i>	Allen's swamp monkey
<i>Allocebus trichotis</i>	hairy-eared dwarf lemur
<i>Alouatta belzebul</i>	devil-handed howler
<i>Alouatta villosa</i>	Guatemalan howler
<i>Aotus azarae</i>	
<i>Aotus brumbacki</i>	
<i>Aotus infulatus</i>	
<i>Aotus lemurinus</i>	
<i>Aotus miconax</i>	
<i>Aotus nancymai</i>	
<i>Autos nigriceps</i>	
<i>Autos vociferans</i>	
<i>Avahi leniger</i>	Peruvian red-necked owl monkey
<i>Callicebus personatus</i>	avahi lemur
<i>Callithrix flaviceps</i>	masked titi
<i>Cercocebus atterimus</i>	buffy-headed marmoset
<i>Cercocebus galeritus</i>	black mangabey
<i>Cercopithecus ascanius</i>	agile mangabey
<i>Cercopithecus campbelli</i>	redtail
<i>Cercopithecus dryas</i>	Campbell's monkey
<i>Cercopithecus erythrogaster</i>	dryas guenon
<i>Cercopithecus erythrotis</i>	red-bellied guenon
<i>Cercopithecus hamlyni</i>	russet-eared guenon
<i>Cercopithecus lhoesti solatus</i>	owl-faced guenon
<i>Cercopithecus mona</i>	mona monkey
<i>Cercopithecus pogonias denti</i>	Dent's guenon
<i>Cercopithecus pogonias wolffi</i>	Wolf'e mona
<i>Cercopithecus preussi</i>	Preuss' guenon
<i>Cercopithecus salongo</i>	
<i>Colobus angolensis</i>	Angolan colobus
<i>Colobus badius</i>	red colobus
<i>Colobus vellerosus</i>	
<i>Cynocephalus volana</i>	flying lemur
<i>Dendogale murinus</i>	northern smooth-tailed tree shrew

Scientific name

Euoticus elegantulus
Euoticus inustus
Galago alleni
Galago thomasi
Galago zanzibaricus
Galagoides demidovii
Gorilla gorilla graueri
Hapalemur simus
Hylobates klossii
Lemus fulvus albifrons
Lepilemur dorsalis
Lepilemur edwardsi
Lepilemur leucopus
Lepilemur mustelinus
Lepilemur septentrionalis
Macaca assamensis
Macaca cyclopis
Macaca ochreata
Macaca pagensis
Macaca thibetana
Nicrocebus rufus
Niopithecus sp.
Phaner furcifer
Pithecia hirsuta
Presbytis aygula
Presbytis cimatta
Presbytis frontata
Presbytis geel
Presbytis hosei
Presbytis phayrei
Presbytis pileata
Presbytis potenziana
Presbytis senex
Presbytis thomasi
Propithecus diadema
Rhibopithecus avunculus
Saguinus inustus
Saguinus midas
Saguinus mystax pileatus
Saguinus nigricollis
Simias concolor
Tupaia dorsalis
Tupaia gracilis
Tupaia javanica
Tupaia minor
Tupaia montana
Tupaia nicobarica
Tupaia tana

Common Name

western needle-tailed bushbaby
eastern needle-tailed bushbaby
Allen's bushbaby

Demidoff's dwarf galago
eastern lowland gorilla
broad-nosed gentle lemur
Nentawai gibbon
white-fronted lemur

Edward's sportive lemur

sportive lemur

Assamese macaque
Taiwanese macaque
booted macaque
Mentawai macaque
Pere David's macaque
rufous mouse lemur
northern talapoin
forked-marked dwarf lemur
shaggy saki
Sunda langur
Javan leaf monkey
white-faced langur
golden langur
Hose's langur
Phayre's langur
capped langur
Mentawai's langur
purple-faced langur
Thomas' langur
diademed sifaka
Tonkin snub-nosed monkey
mottle-faced tamarin
midas tamarin
red-capped tamarin
black-mantled tamarin
simakobu
striped tree shrew
slender tree shrew
small tree shrew
lesser tree shrew
mountain tree shrew
nicobar tree shrew
large tree shrew



Chapter News

Portland Chapter AAZK

Recently elected officers of the Portland Chapter are:

President.....Mary Jo Andersen
Vice Pres.....Bill Eberly
Secretary.....Jan McCoy
Treasurer.....Anna Michel
Chapter Liaison/Corres. Sec'y...
Elayne Barclay

The Washington Park Zoo was especially hectic this past year with hosting the National AAZPA Conference, acquiring a new director, and doing major construction work, including our new Africa exhibit. The Portland Chapter has been in the thick of it all. Along with our continuing programs of Keeper Career slide shows to local schools, employee orientation slide show and tours, and helping send members to conferences (three went to the National AAZK Conference, one to the International Wildlife Rehabilitation Council Conference, and one to the NW Regional AAZPA Conference), we also accomplished additional endeavors. We participated in Recycling Day at the zoo, developed a large portable "poster" describing our Chapter's goals and accomplishments for the National AAZPA and AAZK Conferences, donated \$100 to the Ngare Sergoi Rhino Sanctuary, and helped finance elephant research by donating \$175.00 to Dr. Rassmusen. We initiated a Conservation Fund from 10% of ZooDoo sales, took over responsibility for the Zoo/University List, sponsored a talk about elephants by a former game warden from India, and helped send our senior keeper of Africa to Los Angeles for two weeks to work with their rhino keepers in preparation for the arrival of the first rhino our zoo has had in over 15 years. We are looking forward to organizing and staffing a booth for S.A.F.E. Day (Save Animals From Extinction), a new annual event sponsored by the Washington Park Zoo; and hosting Summer Solstice '88 (a get together of N.W. zoos, aquariums, and wildlife parks for fun, games and goodwill).

--Elayne Barclay
Chapter Liaison

North Carolina Chapter AAZK

In June, a program on reproduction in the Slow Loris was given by Dr. Kay Izard at the Duke Primate Center. Her presentation included slides and was very interesting and informative.

Another pizza sale was held at the N.C. Zoological Park, but was not as successful as the first one, probably due to the weather.

The Chapter members have ordered T-shirts with the Chapter logo printed on them. Work continues on some upcoming fundraisers and educational projects.

--Lucy Segerson, Sec'y

Metro Boston Zoo AAZK Chapter

Chapter Members made several excursions to the Bronx Zoo in May to meet that facilities keepers and get "behind-the-scenes" tours. Included in the highlights were visits to the following exhibits: Wild Asia, World of Birds, Jungle World, the Carter Giraffe Building, the Himilayan Highlands and the Mouse House.

The Chapter had recently been working on a project to have the styrofoam cups used at the concession stands replaced by less environmentally-damaging cardboard ones. They report that the administration has agreed to use the cardboard cups for hot beverages once the current inventory of styrofoam cups is exhausted.

--The Keeper News
Chapter Newsletter

Greenville Zoo AAZK Chapter

Our Chapter has recently published a brochure entitled "Exotic Animals as Pets" for distribution to the visiting public. The brochure discusses the potential dangers of owning wild animals as pets including disease risks. If anyone would like a copy of the brochure, the Chapter would be happy to send you one if you will send a stamped-self-addressed business envelope to: Exotic Pets Brochure, c/o Greenville Zoo AAZK Chapter, Greenville Zoo, 150 Cleveland Park, Greenville, SC 29601.

--Sheila M. Green
Chapter Liaison

Chapter News, Continued

Bronx Zoo Chapter AAZK

On 3 July we had a fascinating lecture on insects, The Unseen Multitude, by Paul Zabarauskas, a Senior Wild Animal Keeper. When not giving lectures, Paul takes care of the invertebrate collection as well as birds in Jungle World. He has successfully reproduced colonies of many species, a few of which are the wandering leaf insects, walking sticks, mantids and leaf-cutter ants.

Since our elections in April, our Chapter Liaison, Linda Loverro, resigned from the zoo. We are fortunate to have John Kiseda, our former president, who has graciously accepted this appointment.

Our in-house Chapter newsletter, published quarterly, had a title already in use. We are currently searching for a new one, but nevertheless, the third edition is in production and will be out soon.

Our patches with the new logo are selling fast and we've decided to reorder. To those who have already ordered them, they are in the mail.

It has come to our attention that AAZK members were required to pay admission on pay days at the Bronx Zoo (Fri., Sat., Sun., Mon.) (Tues., Wed., and Thurs.) are free days). Following a discussion with zoo administration, a compromise has been reached. Those wishing to attend the Bronx Zoo are encouraged to write to us in advance for courtesy packages which include free admission to the zoo and all rides. Please include the expiration date of your AAZK card when writing to us at: Bronx Zoo Chapter AAZK, 185th and Southern Blvd., Bronx, NY 10460.

There are plans in the future for a courtesy booth, but until then we have to ask you to plan ahead to receive free admission!

--Wendy Worth, Secretary

REMINDER: If your Chapter has not yet sent a copy of your Chapter logo for our file here at National Headquarters, we would appreciate it if you would do so. Having all Chapter logos on file is helpful when new Chapters are designing logos in order to avoid duplications.

Audubon Park Zoo AAZK Chapter

New officers elected in June are:

President.....Andy Snider
Vice Pres.....Lilli Thorpe
Treasurer.....Jeff Vaccaro
Chapter Liaison.....Carolyn Kennedy

At our June meeting we had Guatemalan photographer Ricky Lopez give a slide show on nesting Jariru storks. We also recently arranged a special tour of the Tulane University library for our members.

--Carolyn Kennedy
Chapter Liaison

All AAZK Chapters which produce an in-house newsletter are requested to please add National Headquarters to your mailing list. Also, if you have not as yet sent in a sample of your Chapter logo, please do so. We would like to have as complete a file on logos as possible before the Tucson Conference so that we can put together a display of Chapter logos. If you have a Chapter patch, consider sending one to National for display on the "Piece of Your Zoo" patch board. Many Thanks!

Toledo AAZK Chapter

Recently elected officers for the Toledo Zoo AAZK Chapter are:

President.....Sharon Simmons
Vice Pres.....Suzanne Husband
Secretary.....Jennifer Gould
Treasurer.....Michael Dille
Chapter Liaison.....Willis Whittaker

Chapters are reminded to send information for the Chapter News column by the 15th of each month. Include new officers, projects, etc.

Chapter News, *Continued*

Central Arizona AAZK Chapter

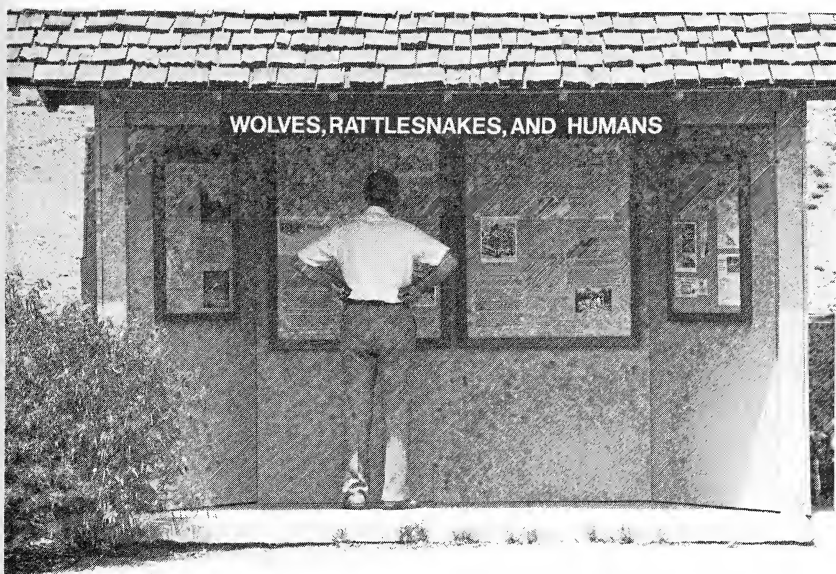
Elected in May as the new officers for the Central Arizona Chapter were:

President.....Rusty Harr
Vice Pres.....Cindy Knapp
Secretary.....Jeanne Grossmayer
Treasurer.....Tracy Fleshman
Member-at-Large.....Marge McHugh
Chapter Liaison.....Luke Thirkhill

The newly adopted Chapter logo for the Central Arizona AAZK Chapter features the head of an Arizona Ridge-nosed Rattlesnake over an oak leaf.

A recently completed project of our Chapter was the shelter (see photo) in which we will exhibit educational posters, designed, researched and written by the Chapter. Topics will be conservation-oriented, and will be changed two to three times a year. Posters will be displayed both at the Phoenix Zoo and Wildlife World Zoo. One poster will focus on local conservation issues and be updated more often.

--Luke Thirkhill
Chapter Liaison



The shelter pictured above features information on local conservation issues and wildlife. It was a project of the Central Arizona Chapter of AAZK which has members at the Phoenix Zoo, Wildlife World in Glendale and the Primate Foundation of Arizona in Tempe. The posters in the exhibit will be changed several times a year providing the public with new information.





DOWN UNDER

By
Judie Steenberg, Keeper
Woodland Park Zoo
Seattle, WA

DOWN UNDER.....is an information column about Australasian animals. While there are a number of Keepers who work in Australasian Units, or routines, often times a Keeper will have a few species

of animals from the Australasian zoogeographical region on their string or routine. It is hoped this section will contain information on birds, mammals and reptiles.

Help in the Care of Orphaned Marsupials

For many years the care and handling of orphaned marsupials has been a matter of trial and error, usually resulting in the demise of the joey. On a trip to Australia I learned about Wombaroo Milk Replacers and Food Supplements, and met a remarkable woman by the name of Helen George.

Helen has been hand-raising animals for 25 years. She started with marsupials and native birds. Later on she also cared for deer fawn and the cubs of large felines from the Taronga Zoo. Over the years, in addition to raising four children, Helen has hand-raised hundreds and hundreds of marsupials.

Those who are familiar with the variation in marsupial milk, which is dependent upon the stage of development of the joey, can appreciate the importance of successfully hand-raising underdeveloped joeys. As a result of years of experience Helen has been involved in the development of Wombaroo Food Products (milk replacers and food supplements for wildlife). "The Care and Handling of Orphaned Marsupials", written by Helen (copyright 1986) gives detailed information on milk choices based on stage of development, and various husbandry aspects such as suitable pouches, nursing equipment, solid food, hygiene and diseases.

The Wombaroo Food Products booklet lists the composition of four formulations for macropods. Growth and age estimation tables are available for the red kangaroo, grey kangaroo, euro, red-necked wallaby, agile wallaby, tammar wallaby, red-bellied pademelo, parma wallaby, quokka and whiptail wallaby. Other marsupial milks include possum, wombat and echidna milk replacers.

Specialized teats have also been developed for kangaroo species and other marsupials. Over the next few issues, excerpts on composition, application, feeding, and information on marsupial milk replacers will be shared with readers of AKE.

Samples of the teats, and kangaroo, deer and flying fox milk replacers, as well as information on Wombaroo Food Products for BIRDS and MAMMALS, will be available for your perusal at the Australasian RAP Session which will be held at the AAZK Conference in Tucson.

Meanwhile, a copy of Helen's paper is available from Judie Steenberg, 9550 2nd Ave. NW, Seattle, WA 98117. For more information regarding Wombaroo Food Products, contact Helen George at the following address: Helen's Fauna Nursing Service, NSW Agent - Wombaroo Food Products, 14 Kilmory Place, Mt. Kuring-gai 2080, AUSTRALIA.



AAZK Regional Coordinators

Co-Directors of Regional Coordinator System

States East of Mississippi - Diane Krug, Rt. 1, Box 273, Hilliard, FL 32097 (904) 225-9559 [work]
(904) 845-4279 [home]

States West of Mississippi - Debbera Stecher, Woodland Park Zoo, 5500 Phinney Ave., North, Seattle, WA
98103. (206) 625-5402 [work] (206) 745-8198 [home]

REGIONAL COORDINATORS

VACANCY - for the states of ME, VT, NH, MA, RI, CT

Peter Buchholz, Bronx Zoo, New York, NY 10460 (212) 220-5154 [w] (718) 229-7711 [h]
for the states of NY, VA

VACANCY - for the states of PA, DE, NJ, MD and the District of Columbia

Bill Whittaker, Toledo Zoological Gardens, Toledo, OH 43609

for the states of MI, IN, KY, and OH

Chris Garland, North Carolina Zoological Park, Asheboro, NC 27203

for the states of NC, SC, TN, and W. VA

Larry Sammarco, Lincoln Park Zoo, Chicago, IL 60614 (312) 294-4660 [w]

for the states of WI, IL, MO, MN, and IA

Tim Kurkowski, Zoo Atlanta, Atlanta, GA 30315 (404) 624-5600 [w] (404) 292-6314 [h]

for the states of GA, AR and AL

VACANCY - for the states of LA and MS

Vikki Bohnert, 2264 Winkler Ave., B-11, Ft. Myers, FL 33901

for the state of Florida

John R. Turner, Denver Zoo, Denver, CO 80205

for the states of CO, NM, and TX

Steve Tigges, Tulsa Zoological Park, Tulsa, OK 74115

for the states of OK, NE, KS, ND, and SD

VACANCY - for the states of WA, OR, ID, MT, WY and AK

Art Goodrich, San Diego Zoo, San Diego, CA 92112

for the states of CA, NV, UT and AZ

Honolulu AAZK Chapter (Dan Vitiello, Pres.) (808) 923-4772 [w]

for the Hawaiian Islands

Terry Male, Metro Toronto Zoo, Box 280, West Hill, Ontario, Canada M1E 4R5

for the Province of Ontario, Canada

Bob Debets, Assiniboine Park Zoo, 2355 Corydon Ave., Winnipeg, Manitoba, Canada R3P 0R5

for the Province of Manitoba, Canada (204) 489-3893 [h]

Marcia Rasmussen, Calgary Zoo, P.O. Box 3036, Stn. B., Calgary, Alberta, Canada T2M 4R8

for the Provinces of Alberta and British Columbia, Canada (403) 235- 5461 [h]

AAZK would like to announce that Marcelle Guidry has resigned as RC for the States of LA and MS due to a career move to Texas. John Linehan has also resigned due to a career move as RC for the States of ME, VT, NH, MA, RI and CT. We thank Marcelle and John for their work on behalf of the Association and wish them well in their new positions. Vacancies now exist for RC positions for the following regions: (1) WA, OR, ID, MT, WY, and AK and (2) PA, DE, NJ, MD and the District of Columbia (3) LA and MS (4) ME, VT, NH, MA, RI, and CT. If you are interested in any of these positions, please contact one of the Regional Chapter Coordinator Co-Directors.

Until the vacancies are filled, those who have questions should contact the following individuals who are temporarily covering the states with vacancies: Tim Kurkowski, Zoo Atlanta, for the States of PA, DE, NJ, MD and District of Columbia as well as LA and MS; and Chris Garland, North Carolina Zoo, for the States of ME, VT, NH, MA, RI and CT.

Need membership information? Want to learn more about AAZK or start a Chapter or become more active - then call your RC! They will be glad to assist you with any information you need about AAZK.

Institutions wishing to advertise employment opportunities are asked to send pertinent data by the 15th of each month to: Opportunity Knocks/AKE, 635 Gage Blvd., Topeka, KS 66606. Please include closing dates for positions available. There is no charge for this service and phone-in listings of positions which become available close to deadline are accepted.

SENIOR WILDLIFE KEEPER...the Forest Preserve of Dupage County has this position open for a candidate possessing an Associates Degree in Biological Sciences and one year experience as a wildlife rehabilitator, veterinary assistant or zookeeper. Bachelor of Science degree in related field or equivalent experience preferred. Successful candidate must be able to demonstrate strong skills in organization, communication, leadership and public relations. We offer salary commensurate with experience, attractive benefit package and pleasant work environment at the Willowbrook Wildlife Haven in Glen Ellyn. Submit resume by 1 September 1988 to: Human Resources Department, Forest Preserve District of Dupage County, P.O. Box 2339, Glen Ellyn, IL 60138.

AVICULTURIST...general husbandry of a large and varied avian collection. Applicant must be able to obtain a Florida chauffeur's license and SCUBA certification. Science degree and/or one year's avian experience preferred. Competitive starting salary and outstanding benefits. Please mail resume to: Sherry Branch, Aviculture Department, Sea World of Florida, 7007 Sea World Drive, Orlando, FL 32821. EOE.

SENIOR ANIMAL KEEPER...degree in zoology, biology or related field preferred, but experience with hoofstock will be considered in lieu of education. Elephant husbandry experience is required. Supervisory position. Salary \$13,776 - \$20,228.

ZOOKEEPER...degree in zoology, biology or related field preferred, but experience will be considered in lieu of education. Recruiting for three positions with the Little Rock Zoo. Salary \$13,038 - \$19,120.

For more information on the above two positions contact: Personnel Department, 500 West Markham, Little Rock, AR 72201. (501) 371-4590. Closing date is 29 August 1988.



Keeper's Alert

Wanted by Zoo Patch Collector - All AAZK Chapter patches and pre-1986 AAZK Conference patches. Send and bill, or quote price. I collect staff, volunteer and souvenir patches and tabs. Contact: Wayne J. Hazlett, 3768 S. 89th Street, Milwaukee, WI 53228.

I am seeking institutions which would be interested in obtaining two male, handraised big brown bats (*Eptesicus fuscus*) for use in educational programs. These animals are not for sale, but would be given to a facility that is willing to give them a good home and use them for bat conservation education. Contact for details: Susan M. Barnard, 6146 Fieldcrest Dr., Morrow, GA 30260 (404) 624-5618.



AAZK Membership Application

Name _____ Check here if renewal []

Address _____

_____ \$25.00 Professional
Full-time Keepers

_____ \$20.00 Affiliate
Other staff & volunteers

_____ \$25.00 International
All members outside the
U.S. & Canada

_____ \$15.00 Associate
Those not connected
with an animal facility

_____ \$15.00 Library
Library subscription only

_____ \$50.00 Contributing
Organizations and
Individuals

Directory Information: Zoo: _____

Work Area: _____ **Special Interests:** _____

Mail this application and check or money order (U.S. CURRENCY ONLY PLEASE), payable to American Association of Zoo Keepers, Inc., to: AAZK National Headquarters, Topeka Zoo, 635 Gage Blvd., Topeka, KS 66606.

Membership includes a subscription to 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 for consideration.

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 no more than 6" x 10" (15cm x 25 1/2cm). Literature used should be cited in the text and in final bibliography. Avoid footnotes. Include scientific name of species the first time it is used. Thereafter use common name. Black and white photos only accepted.

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. Telephone 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, Ext. 31.

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 the American Association of Zoo Keepers, Inc.**

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Animal Keepers' Forum

September 1988



Dedicated to Professional Animal Care

ANIMAL KEEPERS' FORUM, 635 Gage Blvd., Topeka, KS 66606

Editor-in-Chief: Susan Chan
Assistant Editor: Alice Miser
Assistant Editor: Ron Ringer

September 1988
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Number Nine

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Susan Bunn, Minnesota Zoo

Biological Values/Gestation

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States East of the Mississippi - Diane Krug, White Oak Plantation, Yulee, FL

States West of Mississippi - Debbera Stecher, Woodland Park Zoo, Seattle, WA

Individual Regional Coordinators and the states they oversee are listed elsewhere in each issue of AKF.

This month's cover features the Wolf (*Canus lupus*) drawn by AAZK Associate member Janet L. Sephton of White Rock, B.C., Canada. The drawing was inspired by a Wolf Symposium held last May in Vancouver, at which about 150 biologists, trappers and animal activists gathered to debate the controversial provincial government's wolf-control program. Because of their inability to easily co-exist with man, and their alleged competition with the fur-trapping industry, wolves have become one of an everygrowing number of endangered species. Thanks, Janet!

Scoops and Scuttlebutt

A Note from the Assiniboine Park Zookeeper's Association

Dear Fellow AAZK Members:

Contribution. It is the backbone of any organization. Whether by virtue of information, skills, moral or financial support, contribution is the mechanism which allows us to succeed.

Since the formation of our Chapter, the Assiniboine Park Zoo Keepers Association (APZKA), we have, quite often, deliberated and wrestled with the issue of Chapter goals; not so much in terms of 'who are we?', but 'how can we help?'. We have contributed in a number of areas including public awareness and education, international conservation projects, and National AAZK activities. As a Chapter, though, we feel that a most important focus of our goals is to serve the needs and efforts of zoo keepers and the zookeeping profession. By contributing both locally and nationally to the AAZK organization, we can create avenues and opportunities which will enhance the animal care profession in image and attitude.

We are pleased to announce that the APZKA has contributed \$4805.00 to cover the printing costs of the first volume of the Zoo Diet Notebook. As President of the Chapter, I would like to thank all of our membership who have helped with the fund-raising this year, making this important donation possible.

As a Chapter we would encourage other Chapters to direct portions of their fund-raising efforts towards any National projects which they might be interested in supporting.

Mark de Denus, President
APZKA
Winnipeg, Manitoba, Canada

(Editor's note: The AAZK Diet Notebook, Mammals Volume 1, will be available for sale at the Tucson Conference. Mail orders for this volume will begin in October. Our sincere appreciation to all the members of the Assiniboine Park Zoo Keepers Association for their assistance in funding this important AAZK project.)

Nominations for 1989 Board of Directors Election Now Being Accepted

The AAZK Board of Directors will have two positions open during next year's election. Please see the Blue Insert in this month's issue of *AKF* for further information and Nomination Forms. Rachel Rogers of METROZOO in Miami has recently been appointed as Chair of the Nominations and Elections Committee.

Correction on Open Board Meeting Agenda

Due to a very weary editor, who had just put in 230 hours-plus in July working on the Membership Directory and the AAZK Diet Notebook so that it would be ready for Tucson, a confusing error occurred in the printing of the Agenda for the Open Board Meetings at Tucson (August AKF). The agenda for the open meetings begins at the bottom on page 232 and continues on the top of Page 234. The agenda for the Closed Board Meeting begins on the bottom of Page 233 and concludes on the top of Page 232. Sorry for the confusion and inconvenience this may have caused anyone. A correct Agenda for the Open Board Meetings will be posted outside the meeting room at Tucson so that anyone interested in hearing discussion or adding comments on a particular project/program will know at what time discussion on that topic is scheduled. My apologies. S.C.

Request from L.A. Zoo Keepers on Animal Transport

Keepers at the Los Angeles Zoo request that all institutions and individuals sending animals to us PLEASE send an Animal Data Transfer Form along with the animal. Special emphasis on current diet, housing, and medical/health history is appreciated. Thank you. (*Editor's note: Animal Data Transfer Forms are supplied free to all zoological institutions as a service of AAZK. They may be ordered from Project Chairman Bernie Feldman at the Burnet Park Zoo, 500 Burnet Park Dr., Syracuse, NY 13204.*)

Membership Directories Available from National HQ

The 1988-89 AAZK Membership Directory is available for sale through Administrative Secretary Barbara Manspeaker at AAZK National Headquarters. Directories are sent gratis to all new and renewing professional and contributing members. Other membership categories may purchase a Directory for \$4.00. Non-members price is \$7.00. You may order by sending your name and complete mailing address along with a check or money order made payable to "AAZK" to: Directory Order, AAZK National HQ, 635 Gage Blvd., Topeka, KS 66606.



Have any good photos? The AAZK Public Education Committee is looking for photo contributions to be used in the "Zookeeping As A Career" poster project. Photo submitted should show keepers working in the areas of Animal Care, Research, Conservation and Education. We need color photographs in 5" x 7" or 8" x 10" size, or send a negative with your regular size photo. Send photos to: Tom LaBarge, c/o Burnet Park Zoo, 500 Burnet Park Drive, Syracuse, NY 13204.

From the President.....

At the time that this issue of *Animal Keepers' Forum* is released we will be nearing the start of, or in the midst of the 1988 National Conference in Tucson. Many important issues for the membership will be discussed. The minutes from this meeting will be made available in the December issue of the *Forum* and any member desiring further information on any issue should contact any Board Member or Headquarters.

In 1989 two Board positions will become vacant. The Nominations and Elections Committee has now become active. Any professional member may serve on the Board of Directors and should contact Rachel Rogers, the new Nominations and Elections Committee Chairperson, for more details. Rachel is taking the chair for the NEC following her resignation as Chairperson of the Awards Committee, a task she handled exceptionally for the past three years. We owe many thanks to Rachel for her successful efforts at reorganizing the Awards Committee.

The Consortium of Universities, Aquariums and Zoos (CAUZ) has released its 1988 directory. This volume lists professionals in animal-related fields and their research interests. The directory may be obtained from California State University at Northridge.

The period following a National Conference can be hectic and exciting. Keepers returning from Tucson will report on activities of the organization, papers presented and information exchanged with their colleagues. While the fires of enthusiasm are still burning hot, I encourage all members to find ways to involve themselves not only with AAZK, but with their zoo and community to communicate the importance of conservation. We are the best messengers as we represent a direct link between the public and the animals they view at our facilities. If you need any guidance please contact us. We are here to help you develop and implement your ideas.



Frank B. Kohn
AAZK President

Public Education Committee

In the April 1988 issue of *AKF*, the Public Education Committee solicited answers from the membership to questions frequently asked by zoo visitors. The committee is seeking the "best" answers to such questions to incorporate in a booklet. The following is the fifth question restated and the "best" answer to that question. Another frequently asked question will appear at the end of this article - please take a few minutes and put your thoughts together and send them to Ellen Bradfield at the address given below.

Question # 5 was: How do the animals feel about living at a zoo?

The answer to Question # 5 is:

Most zoo animals are born in captivity, and so do not "miss" the wild. An animal will instinctively respond to its environment, regardless of its size or location. For example, an animal will defend its "territory" whether it be an outdoor area, or a smaller indoor exhibit. However, those animals transplanted to captive environments do undergo a period of adjustment to their new surroundings. Naturalistic exhibits that take into account an animal's biological and psychological needs can help ease this adjustment.

Question #6 will be: What about animal nurseries in zoos?

Please send any answers, comments, or suggestions to: *Ellen Bradfield, Zoo Atlanta AAZK, 800 Cherokee Avenue S.E., Atlanta, GA 30315.*



Coming Events

14th National AAZK Conference

September 11-15, 1988

Tucson, AZ

8th Annual Conference of the Association of Zoological Horticulture

September 11-15, 1988

Tucson, AZ

AAZPA Annual Conference

September 25-29, 1988

Milwaukee, WI

Hosted by the Milwaukee County Zoo. For further information contact: *Kerry Bublitz, Public Relations & Advertising Coordinator, Milwaukee County Zoo, 10001 W. Bluemound Rd., Milwaukee, WI 53226.*

The Biennial Conference of the International Association of Zoo Educators

October 2-7, 1988

Toronto, Canada

To be held at Park Plaza Hotel, Toronto. The theme for the conference is "Communicating for Conservation". Featured at the meeting will be general papers, colloquium papers, workshop sessions, poster displays and moderated discussion groups. For further information, contact: *Merebeth Switzer, Metro Toronto Zoo, P.O. Box 280, West Hill, Ontario, Canada M1E 4R5.*

The 5th World Conference on Breeding Endangered Species in Captivity

October 9-12, 1988

Cincinnati, OH

For further information contact: *Betsy Dresser, Director of Research, Cincinnati Zoo, 3400 Vine St., Cincinnati, OH 45220 (513) 281-4701.*

The First International Symposium on Spectacled Bears

October 14-15, 1988

Chicago, IL

To be held at the Lincoln Park Zoo. Topics focusing on current field studies and captive management/reproduction of the spectacled bear will be highlighted. These include: captive management, demographics, reproduction in captivity, nutrition, vocalization and mother/infant behavior. For further information contact: *Mark Rosenthal, Curator of Mammals, Lincoln Park Zoo, 2200 N. Cannon Drive, Chicago, IL 60614, (312) 294-4660.*

NOTICE: The Scholl Conference on the Nutrition of Captive Wild Animals will not be held in 1988. The next Nutrition Conference will be held in late 1989 at the Lincoln Park Zoo. Any persons interested in submitting papers for the 1989 conference should contact: *Dr. Thomas P. Meehan, Lincoln Park Zoo, 2200 N. Cannon Dr., Chicago, IL 60614 (312) 294-4689.*

Coming Events, *Continued*

IMATA 16th Annual Conference

Oct. 30-Nov.4, 1988

San Antonio, TX

Meeting of the International Marine Animal Trainers Association. Conference will include paper sessions, post presentations, trophy competition, Photo/Art contest and a day trip to Sea World. For further details contact: *Ken Ramirez, IMATA Vice-Pres., Entertainment Plus, 6608 Stewart Road, Suite 169, Galveston, TX 77551 (409) 744-0938.*

Association of Zoo Veterinary Technicians Eighth Annual Conference

Nov. 4-6, 1988

Toronto, Canada

To be held at the Hotel Sheraton Centre. Topics will include: handrearing the infant orangutan; reproductive research in embryo transfer; and reptile medicine, including anaesthesia of venomous snakes. Registration fee of \$100 includes attendance to all presentations, luncheons, and banquet dinner. A copy of conference proceedings, as well as local transportation are also provided. For information, contact: *AZVT Vice-President, Virginia Crossett, Louisville Zoo, P.O. Box 32750, Louisville, KY 40233 or call (502) 459-2181.*

Ninth Annual Elephant Workshop

Dec. 7-10, 1988

Jacksonville, FL

Hosted by the Jacksonville Zoological Park. For further information contact: *John R. Meyer, P.O. Box 26727, Jacksonville, FL 32218 or call (904) 757-4463.*



Information Please

I am seeking information on elephant management techniques, specifically which zoos **do not** chain their elephants overnight. If this is part of the elephant management program at your facility, I would appreciate you letting me know, i.e., how many elephants you have, whether African or Asian, how long has the "no chaining overnight" policy been utilized? Please send information to: Donna Robb, 1822 East Drive, Hinckley, OH 44233.

AAZK Welcomes New Professional Members

Heidi Basken, W.D. Stone Memorial Zoo, (MA)	Frances Verna, Bronx Zoo (NY)
Amie Vaughan, Franklin Park Zoo (MA)	Kenneth M. Billin, Pittsburgh Zoo (PA)
Grayson Harding, National Zoo (DC)	Jackie Ramey, Greenville Zoo (SC)
Michael R. Sandy, NC Mus. of Life/Science (NC)	Thomas K. Dotson, Knoxville Zoo (TN)
Betsy Dearth, Homassa Sprgs Nature World (FL)	Valerie Nichols, Dallas Zoo (TX)
Kimberly Kumfer, Ft. Wayne Children's Zoo (IN)	Antonio Garza, San Antonio Zoo (TX)
Gary Kirkwood, San Antonio Zoo (TX)	Carol Sharp, Hogle Zoo (UT)
Debby Clutter, Arizona-Sonora Desert Museum (AZ)	James Rexroth, Micke Grove Zoo (CA)



Births & Hatchings



Brookfield Zoo AAZK Chapter... reports the following notable births and hatchings from January to the 11th of July 1988: 0.0.3 Blue crowned king parrot, 0.0.5 Violet touraco (including a clutch of three), 0.0.2 Grey-headed kingfisher, 0.0.4 Trumpeter swan, 0.0.3 Humboldt penguin, 0.0.2 Harbor seal, 2.1 Sugar glider, 5.1 Slender-tailed meerkat, 1.0 Common tree shrew, 0.0.1 Owl monkey, 1.0 Slender loris (*Loris tardigradus nordicus*) [this represents the first of this subspecies born in North America], 2.1.1 Golden-headed lion tamarin, 2.1 Cotton-top tamarin, 0.1 Black and white colobus, 2.0 Tonkeana macaque, 1.1 Western lowland gorilla, 0.2 Common waterbuck, 2.0 Reticulated giraffe, and 2.1 Snow Leopard. This year we had our 200th Callimico Goeldii born since the start of our colony in 1977. Other B&H included: 0.0.3 Poison arrow frogs, 0.0.1 Eastern box turtle, 0.0.14 Siberian rat snakes, and 0.0.4 Brazilian gecko. Our colony of Brazilian cockroaches continues to grow. submitted by Susan Edwards, Brookfield Zoo, Brookfield, IL.

Boston Metro Zoos AAZK...some of the notable additions to Stone Memorial and Franklin Park Zoos included 0.0.1 Sable antelope (*Equus brucei*) and 1.0 Black and white colobus (*Colobus guerezas*). The Bird Dept. has had an extremely productive year so far. Our recently acquired Hadada ibis (*Hagedashia hagedash*) fledged 0.0.3 young. The first Inca tern (*Larosterna inca*) produced at our zoos in many years was successfully hand-reared. Other notable hatchings included: 0.0.4 Nicobar pigeon (*Caleonas nicobarica*), 0.0.7 Pied imperial fruit pigeons (*Ducula bicolor*), 0.0.1 Australian crested pigeon, 0.0.1 Long-tailed glossy starling (*Lamprolornis eaudatus*), 0.0.1 Blue crane (*Grus paradisea*), 0.0.4 Red crested pochard (*Netta rufina*), and 0.1 Eclectus parrot (*Electus roratus*). submitted by Tom Aversa, Chapter Liaison, Boston Metro Zoos AAZK Chapter.

Los Angeles Zoo AAZK Chapter...significant occurrences at the Los Angeles Zoo for the month of July include: the birth of 0.1 Masai giraffe, on 11 July; this calf is the first live giraffe birth we've had since 23 December, 1973! She had been named Kamili, which means "perfect" in Swahili, and is doing very well. Also born were 0.1 Mountain tapir, 0.0.1 Black howler monkey, 0.0.1 Woolly monkey, 0.0.1 Celebes crested macaque, 0.0.1 Emperor tamarin, 0.0.1 Golden-headed lion tamarin, and 0.0.5 Capybara. On 8 July 1.0 chimpanzee was born to Nan, who is a first-time mother. Mom is taking excellent care of him, and they can be seen on exhibit daily with the rest of our chimp troop. Also born during July were 0.1.3 Bat-eared foxes of which 0.0.3 DNS. The femaling female, named Sally after the Flying Nun, is being hand-reared in our Children's Zoo Nursery. On 11 July we received a female zebra duiker from the Frankfort Zoo, West Germany. The L.A. Zoo now holds all the zebra duikers in captivity (4.2) in the "free world". submitted by Kim Brinkley, Chapter Liaison, L.A. Zoo AAZK Chapter, Los Angeles, CA.

Cheyenne Mountain Zoo AAZK Chapter...reports the following B&H at their facility from April through June 1988: 0.0.1 Lion-tailed macaque (*Macaca silenus*), 0.0.2 Black crested manglebeey (*Cercocebus atterimus*), 0.0.1 Mandrill baboon (*Mandrillus sphinx*), 0.0.2 Patas monkey (*Erythrocebus patas*), 1.0.2 Black and white colobus (*Colobus guereza abyssinicus*), 1.0 Siberian tiger (*Panthera uncia*), 1.0 Reticulated giraffe (*Giraffa camelopardalis reticulata*), 5.2 Rocky mountain goat (*Oreamnos americanus*), 6.0 Himalayan tahr (*Hemitragus jemlahicus*), 3.2 Alpine ibex (*Capra ibex*), 0.1 Musk ox

Births & Hatchings, Continued

(*Ovibus moschatus wardi*), 1.0 Suni antelope (*Neotragus moschatus akeleyi*), 0.0.1 White-tailed sea eagle (*Haliaeetus albicilla*), 0.0.1 Indian blue peafowl (*Pavo cristatus*) 0.0.5 Spurred-winged plover (*Vanellus spinosus*), and 0.0.1 White-cheeked touraco (*Tauraco leocotis*). submitted by Nanette Bragin, Chapter Liaison, Cheyenne Mountain AAZK Chapter, Colorado Springs, CO.

Busch Gardens/Tampa...reported B&H for July 1988 include: 0.0.1 White-bearded gnu, 4.2 Greater kudu, 6.5 Thomson's gazelle, 2.1 Nyala, 0.1 Grevy's zebra, 2.0 Grant's gazelle, 1.0 Dromedary camel, 1.0 Addra gazelle, 1.0 Uganda kob, 18 Nile crocodiles, 15 Pygmy rattlesnakes, 11 Mangrove water snakes, and 25 Black racers Hatched were: 0.0.1 Jandaya conure, 0.0.1 Severe macaw, 0.0.11 Indian peafowl (blue phase) , 0.0.1 Indian peafowl (white phase), 0.0.2 Scarlet ibis, 0.0.7 Blue and gold macaw, 0.0.9 American flamingo, 0.0.7 Sun conure, 0.0.4 Mitred conure, 0.0.1 Mexican military macaw, 0.0.1 Quaker parakeet, 0.0.1 Edward's lorikeet, 0.0.3 White-bellied caique, 0.0.9 Red-billed tree duck, 0.0.3 Golden-capped conure, 0.0.4 Painted conure, 0.0.2 Scarlet macaw, 0.0.1 Blue-streaked lory, 0.0.1 Violet-necked lory, 0.0.2 African gray parrot, 0.0.1 Red-crested touraco and 0.0.2 Hahn's macaw. submitted by Mary Eisenacher, Animal Records, Busch Gardens, Tampa, FL.



Captive Breeding of Aye-aye to Begin at Duke

By
Bill Hess, Technician
Duke University Primate Center
Durham, NC

In January the Duke University Primate Center (DUPC) acquired two adult male aye-aye (*Daubentonia madagascariensis*). These are the first in captivity in the United States. The aye-aye were captured near Ankobe in northeast Madagascar. This summer the DUPC will conduct a mission to capture two female aye-aye. These two pairs, along with three aye-aye at the Vincennes Zoo in Paris, France, will form the nucleus of a captive breeding program.

The aye-aye is perhaps the world's most endangered primate species. It is the only living member of its taxonomic family and is the only primate endangered at the family level. It is estimated that only a few hundred survive in the wild today. Over 75 nests had to be searched before these two aye-aye were found. The World Wildlife Fund (WWF) and the International Union for the Conservation of Nature (IUCN) have both given the aye-aye the world's highest priority among primates for protection in captivity.

The aye-aye have adjusted well to captivity at DUPC. These nocturnal primates are housed at the Center on a reverse light cycle. They are provided a diet consisting of three types of grubs (wax worms, corngrubs, and meal worms), sugar cane, ripe and green coconuts, mangoes, apples, bananas, and an occasional raw egg. The two aye-aye weigh 3.0 kg each and both appear healthy. They also have begun building nests when given fresh leaves and bamboo branches.

Aye-aye are unique among Madagascar's extraordinary array of primates. In the wild, they forage at night for insects, grubs, fruit and other items. Aye-aye have powerful, ever-growing incisors that are used for ripping away the bark of trees to expose insects. (The aye-

Births and Hatchings, *Continued*

aye at the DUPC gnaw on small branches provided them). Aye-aye also have a remarkably elongated third finger which is used to pry grubs out of crevices.

The aye-aye are remarkably gentle and curious animals, and they are a delight to the staff and visitors of the DUPC. Researchers have initiated behavioral studies that will add to the little that is known of these unique creatures. With the start of a captive breeding program and the DUPC's increasing involvement in conservation in Madagascar, we hope to help bring the aye-aye back from the brink of extinction.



The Aye-aye, perhaps the world's most endangered primate species, will soon begin a captive breeding program at the Duke University Primate Center in Durham, NC. (Photo by: David Haring)



Video Production Workshop.....

Do you have an idea for a Keeper training videotape but don't know how to go about producing it?

Do you have good organizational skills but not the technical skills to produce a video for use in Keeper training?

Is there a special situation at your zoo that would lend itself to a Keeper training videotape?

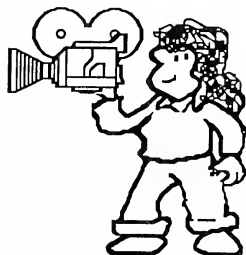
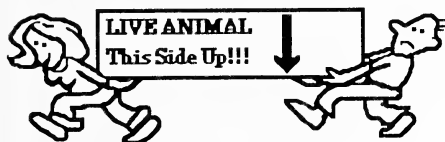
Do you have writing skills that could be used to develop a script?

Do you want to get together to discuss storyboarding?

Are you willing to work with others who are interested in producing Keeper Training Video Tapes?

IF YOU ANSWERED "YES" TO ANY OF THESE QUESTIONS, BE SURE TO ATTEND THE VIDEO PRODUCTION WORKSHOP AT THE TUCSON CONFERENCE.

IF YOU HAVE KEEPER TRAINING TAPES OR RAW FOOTAGE THAT YOU THINK COULD BE USED IN A KEEPER TRAINING VIDEO, PLEASE BRING THEM ALONG TO TUCSON.



**Agenda for the 14th National
AAZK Conference
Tucson, AZ
September 11 - 15, 1988**

Sunday **Registration 1:00 p.m. - 4:00 p.m. & 7:00 - 8:00 p.m.**

Evening **Ice Breaker
Guest Speaker - Virginia Landau - Jane Goodall
Institute
Music and Dancing**

Monday **Paper Sessions**

Evening **Sonoran Anthropol Studies Workshop
Tucson Chapter/AAZK "Conference Roach Contest"**

Tuesday **Tour Arizona-Sonora Desert Museum w/complimentary lunch
Tour Reid Park Zoo
Zoolympics
Dinner sponsored by the City of Tucson Parks and
Recreation Department**

Evening **Australasian Rap Session
"Keeper's Night" at the Javalina Cantina**

Wednesday **Concurrent Workshop Sessions**

**AAZK Video Projects
AAZK Diet Notebook
Animal Capture and Handling Techniques
Zoo Herpetological Management
AAZK Chapter Liaisons/Regional Coordinators**

Afternoon **Tour the Larson Company, Artificial Exhibit Interiors
and Exhibit Design - Hosted Reception**

Evening **AAZK Silent Auction**

Thursday **AAZK/AKF Awards Breakfast**

**Paper Session
General Business Meeting**

Evening **Cocktail Party
Banquet
Live Auction
Live Music and Dancing**

Here are a few of the many papers that will be presented at the 14th National AAZK Conference. Thursday's Paper Session will be held in conjunction with the Association of Zoological Horticulture.

- ✧ Rethinking the Children's Zoo
- ✧ Giant Pandas at the Calgary Zoo
- ✧ Observations on Hoffman's Two-Toed Sloth (*Choloepus hoffmanns*)
- ✧ Parturition at the Burnet Park Zoo
- ✧ Conservation at the Washington Park Zoo
- ✧ Pandamonium, What's Going On?
- ✧ Successful Techniques for Hand-Raising an Egyptian Fruit Bat
- ✧ Breeding Success & Rearing of Offspring in a Group of California Sea Lions
- ✧ ESP - Ecosystem Survival Plan
- ✧ Strategies for Exhibit Plantings for Large Felids
- ✧ Taronga Zoo's Bird Department - A New Structure and Philosophy - a Keeper's Point of View

And many more!



In looking over the registrations that have been mailed to the Tucson Chapter for this year's conference, we have noticed that under "Bringing an Auction Item?" many delegates, instead of marking a yes or no choice, have listed a question mark, as if they are unsure of what the auction is.

This year, as in past years, there will be two auctions held. Delegates bring selected items from their zoo or local AAZK Chapter. These items can be as simple as posters, buttons and T-Shirts, or as elaborate as custom artwork done by keepers. The items are then offered back to the conference delegates in the form of "Silent" bidding, on Wednesday night and in a "Live" format on Thursday night.

All monies received in the auction go to the host Chapter to help offset the costs of putting on the National AAZK Conference. Monies received also go to the National AAZK Office to help with their yearly expenses.

If you have never participated in an AAZK Auction, you are in for something special. Treasured zoo memorabilia, artifacts, souvenirs and just useless items are there for the bidding. The competition is fierce, but the atmosphere is friendly at the AAZK Auctions. You never know what will happen, just ask Frank Kohn when you see him at the Conference.

So, if you checked a ? by the "Auction Item" blank, now you know; if you marked NO, reconsider, that bronzed elephant feces doorstep that you trip over everyday may be just what some crazy zoo keeper will spend money for.



Dear AAZK members and delegates to the 14th National Conference,

The Tucson Chapter/AAZK would like to take this opportunity to welcome in advance the delegates to the 14th National American Association of Zoo Keepers' Conference to be held in Tucson, Arizona, September 11-15, 1988. The Tucson Chapter/AAZK has put in many hours of labor to make this conference a successful event.

We feel that we have put together a program that is informative and interesting to all who attend. We have attempted to be diverse in our selection of workshops, papers and activities, making sure that as many aspects of the zoo keeping profession are covered as possible. We have topics from Arthropods to Elephants, and most everything in between.

The Tucson Chapter/AAZK has done almost every type of fundraising that comes to mind. Swap meets, aluminum can collection, auctions, raffles, and a few things that can only be mentioned in private conversation. This will surely be a conference to remember.

The Tucson Chapter/AAZK and I would like to personally thank the staff of National AAZK Headquarters. Without their patience and guidance, the information that was published in AKF would have been a complete and total mess. I was chronically beating the publishing deadlines by mere hours, and I was never yelled at once. My cryptic notes asking that things be placed in a certain order for a certain reason were always transcribed correctly, although I don't know how. Thanks, Susan. Thanks. Barb.

For those delegates who are attending their 1,000,000th AAZK conference, we know that you will be pleased with the program that we have selected. For those delegates who are attending their first AAZK Conference, we will try to make you feel welcome and as comfortable as we possibly can. For those of you who are not able to attend this year's AAZK Conference in Tucson, make plans now to attend the 1989 Conference to be hosted by the Burnet Park Zoo AAZK Chapter in Syracuse, NY from October 1-5, 1989. They are working very hard to make the last conference of the 80's a special one, and we wish them the best of luck.

The Tucson Chapter/AAZK looks forward to seeing old friends and meeting new ones starting the second week of September. I hope that you'll be here to do the same.

Sincerely,

Ed Hansen
Co-Chair Conference '88

Dear AAZK Members,

With the 1988 National Conference in Tucson close at hand, the members of the Central Arizona Chapter in Phoenix extend an invitation to take the post-conference tour. The bus tour will consist of a short and scenic route to the Phoenix area where you will be introduced to two additional Arizona zoological facilities.

Your first stop at the Wildlife World Zoo will include a breakfast of eggs, sausage, hashbrowns, donuts, coffee and juice. Conference members will receive discounts of 50% off on refreshments and 20% off on gift shop items. A walking tour of the zoo follows which includes a unique collection of exotic birds featuring one of the country's largest collections of Cracids and Ratites. Also featured is a Tropical walk-through aviary with over twenty species represented. The innovative Finch Flyway exhibit will be of particular interest.

The mammal collection contains a variety of species such as Maned Wolves, African Wild Dogs, and Jaguars featured in an overhead walkway exhibit.

Your afternoon arrival at The Phoenix Zoo will be kicked off by a catered buffet luncheon of meats, cheeses, salad bar, dessert and refreshments. Additional drinks from the snack bar will be at a 50% discount. Gift shop items may be purchased at a 20% discount. Following lunch will be guided group tours of the zoo grounds which will include behind-the-scenes viewing of many of the major exhibits. Keepers will be available in each area to give information and answer questions.

Transportation to the Sky Harbor airport will be provided for persons scheduled to leave from Phoenix rather than Tucson.

We hope that you enjoy every facet of your trip to the 1988 National Conference of AAZK, and that the tours of the Arizona Zoos give you many insights into Southwestern practices of captive animal management.

Sincerely,

Jeanne Grossmayer
Secretary, Central AZ Chapter

Stuart Wells
Animal Keeper, Phoenix Zoo



First Central American Zoo Meeting Held in Guatemala City

Sixty representatives from nine countries attended the First Central American Symposium on the Administration and Management of Zoological Parks held 20-24 June in Guatemala City. Participating countries included Guatemala, El Salvador, Costa Rica, Nicaragua, Panama, Belize, Mexico, Honduras and the United States.

The objectives of the meeting were to learn the present state of development of Central American zoos, outline goals of zoological parks and create an organization within Mesoamerica to promote the exchange of information and cooperation between zoos. The agenda included presentations on the inventory of species, diet, educational programs, administration and financing, exhibit and park design, and medical care.

Al Lieberman, Curator of Birds at the San Diego Zoo, discussed the use of computer programs for record keeping. Joe Christman, Curator of Mammals at the Dallas Zoo, addressed nutrition in primates. Susan Wells, DVM of the Audubon Park Zoo in New Orleans gave presentations on preventative health care procedures and capture and restraint of captive wild animals.

David Anderson, Associate Director of the Audubon Park Zoo, discussed the Zoo Conservation Outreach Group, a newly formed program consisting of 25 zoos in the southeast region who assist Central American zoological facilities along with local conservation efforts.

Robert Wagner, AAZPA Executive Director, discussed the history and organization of U.S. zoos and assisted our Central American colleagues in establishing AMaZO (Association of Mesoamerican Zoos). There was a tremendous spirit of cooperation at the meeting as zoo directors and curators, veterinarians, university professors, biologists and aviculturists shared information despite language barriers.

The majority of zoos in Mesoamerica are in poor condition due to inadequate funding. The lack of basic medical information is particularly apparent. Most facilities do not have the equipment and expertise to administer proper medical care to the species they display. In spite of these limitations, zoos in Central America are as popular as zoos in the U.S. and their visitation is phenomenal. These zoos are in a unique position to educate local residents about their own natural resources of flora and fauna. Many zoos expressed interest in displaying indigenous species in their collections for this reason.

As part of the Zoo Conservation Outreach Group, Audubon Park Zoo will serve as a clearing house to receive used veterinary textbooks and journals. Although publications on avian and wild animal medicine will be particularly useful, information on all aspects of veterinary medicine is needed. Printed material will be forwarded to La Aurora Zoo in Guatemala City which will serve as a central reference library and distribution point.

The countries in Central America possess some of the most critically endangered and biologically diverse habitats in the world. The benefits derived from rain forest products are universal and it is well known that the elimination of these ecosystems may well affect the climate of the entire planet.

The zoos in Central America have dedicated staffs of concerned individuals who can spread the conservation message to local populations, but support from the United States is essential to their success. Donations of books and journals may be sent to:

Susan Wells, D.V.M.
Staff Veterinarian, Audubon Park Zoo
6500 Magazine Street, New Orleans, LA 70118
(504) 861-5109





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Legislative Outlook

By

John Stoddard
AAZK Legislative Advisor
Brookfield Zoo, Brookfield, IL



Senate passes Endangered Species Act

On 28 July 1988 the Senate passed a bill reauthorizing the Endangered Species Act by a vote of 93-2. This action marks the first time since 1985 that the Senate has officially renewed the program. Protection efforts since that time have been funded on a year-to-year basis.

The Senate bill contains several amendments that will strengthen the ESA by providing it with more funding and power.

The bill will now pass into conference where the Senate committee members will work out a compromise version with House committee members. The House version of this bill was passed by a vote of 399-16 last December. Passage by the Senate after a four-year impasse makes reauthorization of the ESA before the end of the current Congress likely.

> *From the Chicago Tribune (30 July 1988)*

Blueprint for the environment

Most of the nation's leading environmental and conservation organizations have joined together to develop a comprehensive series of policy recommendations—a "Blueprint for the Environment"—to be presented to the incoming Administration shortly after the elections in November. The goal is to make use of the two-month transition period between Election Day and Inauguration Day to present a broad array of environmental policy recommendations to the new President, Cabinet, and Congress. In the past, the environmental community's efforts to reach incoming administration have been ad hoc and relatively uncoordinated.

The Blueprint will consist of concisely stated recommendations for actions to be taken by the new administration to provide greater protection for all aspects of the environment. Blueprint for the Environment is designed to be non-partisan and will not become involved in the presidential campaigns. Its recommendations will be presented to whichever candidate wins the election.

The recommendations will be developed by Task Forces comprised of persons on the staffs of participating environmental organizations and others who are actively involved in environmental issues. The recommendations will be assembled into "Green Books" which will be given to each cabinet officer and sub-cabinet official, and will contain all of the recommendation that are relevant to that official's authority and jurisdiction. Each recommendation will be summarized on a single sheet of paper in a standardized format in the Green Books, and will indicate what should be done, why, and how, as well as budgetary considerations.

As a separate exercise, the Blueprint will also assemble a "Talent Bank," consisting of a nationwide list of persons considered highly qualified for appointment to key environmental positions in the new administration.

> *From AAZPA Legislation Committee and Blueprint for the Environment*

International Whaling Commission

The 40th annual meeting of the International Whaling Commission (IWC) was held in Auckland, New Zealand from May 30 to June 3, 1988. The U.S. delegation was led by Dr. William Evans, U.S. Commissioner to the IWC. At the meeting were 157 delegates from 29 countries, 1 non-member government, 3 international governmental organizations, and 51 international non-governmental organizations. Edward D. Asper, AAZPA Legislative Advisor, attended the meetings and reported that the meeting appeared to be more of a platform for positional moves for the next two years, especially 1990, when the comprehensive assessment of whale stocks is scheduled to be completed.

The major features of the meeting, as reported by Mr. Asper, were as follows:

A working group had met to discuss the revision of the convention, its language, competency, and future activity. The USSR again proposed that there needs to be a revision to the convention. The Commission requested the Contracting Governments to submit comments and proposals to the working group for consideration during 1989.

Scientific permits were discussed at length. A Norwegian proposal defined as "a program to study and monitor Northeast Atlantic minke whales, 1988-1992," which would involve 35 minke whales in 1988, was rejected by a vote of 14-4 with 10 abstentions. An Icelandic proposal to catch 80 fin and 20 sei whales in 1988-89 was discussed, but the science behind the proposal was rejected as not meeting the proper criteria, and the proposal was never brought to a floor vote.

The United Kingdom offered a proposal that the Commission request that the Contracting Government responsible for a proposed scientific permit refrain from issuing any permit for 60 days to give the Commission time to consult with the Contracting Governments before deciding how to proceed. The resolution passed by a vote of 13-1 with 13 abstentions.

Changes were made to aboriginal/subsistence whaling in regards to the bowhead whale. The new limits for 1989-1991 were set at a maximum of 44 whales struck and a maximum of 41 whales landed except that for 1988-90 any unused strikes—up to a maximum of 3—shall be transferable to the following year.

Japan proposed a concept that falls into a new category between aboriginal/subsistence and commercial whaling. They defined it as "various types of small-type whaling," and based the need on cultural and economic situations in certain geographical locales in Japan. There was a profusion of debate resulting in the establishment of a working group to consider the proposal. Japan then requested an interim relief allocation of various small-type whales to be caught, but after extensive discussions, no action was taken.

The subject of whether small cetaceans should or should not be under the jurisdiction of the IWC was not on the agenda but was brought up several times during discussion of other subjects. The subject is controversial and certain Contracting Governments continue to assume that the IWC does have competency to handle such matters. A representative from the United Nations Environment Programme (UNEP) made a proposal to the Commission to acknowledge a formal meeting that will be held in early 1989 to discuss world-wide small cetacean issues.

> *From AAZPA Legislation Committee*



Viewpoint

Another Point of View

By
Judie Steenberg
Seattle, Washington

After reading Wayne Hazlett's Viewpoint, I chose not to reply although it concerned me since I do not condone excluding Chapter members from activities or thinking less of anyone because they are not a Professional member of AAZK. I hoped what sounded like a local problem would be resolved.

When Kevin Patton expressed his Viewpoint in the next issue of AKF, again I chose not to reply. Yet, I wondered if he knew of the long-term, thankless efforts of many Regional Coordinators over the years who tried to do exactly what he was suggesting. AAZK membership has always been open to "...individuals and associations interested in the objectives and purposes of the Association."

Liz Arnold's Viewpoint concerning "...present narrow guidelines", and "old-fashioned class distinction" and the subsequent Editor's note clarifying "Professional" member status caused me to sit down and offer another point of view.

First, AAZK has had a long and difficult history in becoming the sole organization that represents Zoo Keepers in their efforts toward professional animal care. How much do you know about the Association, its history and goals?

Second, how involved are you in supporting the Association through its various committees? Many of AAZK's strongest supporters are Affiliate and Associate Members. Everyone's contributions are needed and welcomed...our goals are the same regardless of our "classification".

Finally, from 1971-1975, as a Docent and Zoo Volunteer, I was an Associate member of AAZK. From August, 1975 through September 1979 I enjoyed Professional member status...four years of studying and working to become a Keeper had finally resulted in obtaining employment as a Zoo Keeper. For 18 months my classification changed back to Associate when I left the Zoo field, but my AAZK membership was still important in that I was supporting something I believed in. Since June 1981 I've been a Professional member again.

When I leave Zoo Keeping, my membership will change again, to Affiliate or Associate, depending on my job situation. My point is that membership "classification" isn't as important as what a member is doing to support the Association. AAZK has always enjoyed the support of people from all classes and levels of zoo operations, and I expect it always will.

AAZK will only be as strong as the support and involvement of its membership.



ELECTION.....'89

WE WANT YOU! Do you wish to help your professional organization? Become an AAZK Board Member. Two seats are up for election - those held by Susan Barnard and Brint Spencer, whose terms expire 31 December 1989. New Board Members will serve from 1 January, 1990 through 31 December, 1993. Why is this first call for nominations so early? **TIME** is the answer. Nominations, candidate verification and tallying mailed ballots require time. We also wish to notify winners early enough to allow them to make arrangements to attend the National AAZK Conference **before** they assume office the following January. This will enable the new Board Member to become familiar with Board responsibilities and AAZK activities before they assume responsibility for our organization.

Duties of the Board of Directors

For a more detailed explanation of the expanded duties of the Board, refer to the By-Laws - available upon request from National).

- 1) Select, appoint or remove officers, committees, agents and employees of the Association, including - prescribing powers and duties.
- 2) To control and manage the Association and its property, passing upon acquisition and disbursements with approval of a majority of the Board.
- 3) To formulate policies, rules and regulations in accord with the Constitution & By-Laws.
- 4) To uphold the Constitution of AAZK and the policies of the Association.
- 5) To appear at Board meetings, to accept Board assignments and to devote the time to communications pertinent to all Board business, including answering correspondence promptly and efficiently.

Qualifications for Nomination

- 1) Nominee must be a Professional Member of AAZK and must have been a member of the Association for at least one year.
- 2) Nominee must be presently employed as an animal keeper/attendant by a recognized zoological institution or aquarium in the U.S. or Canada and must have been in the zoological field for at least two years.

Nomination Procedure

- 1) Nominator Form:
 - a. List the name of the nominee, phone, address, and institution.
 - b. State in 150 words or less the reason(s) why the nominee warrants election to the Board.
 - c. Nominator signs forms and mails to NEC Chairperson.
 - d. Notifies nominee that they nominated him/her for the Board.
- 2) Nominee Biographical Form:
 - a. Professional background: places of employment, length of service, titles.
 - b. Membership in AAZK: National and local chapters, number of years, offices held, involvement in activities.
 - c. Educational background.
 - d. Membership in Affiliate Organizations: (AAZPA, Audubon, etc.)
 - e. Other information the nominee feels is pertinent.
 - f. References (one or two)
 - g. Nominee signs forms and mails to NEC Chairperson.

NOTE: Candidate is ineligible for nomination if **both** the nominator and nominee biographical **forms** are not **complete** and **returned** to the NEC Chairperson by **31 January 1989**. Forms are in this issue of **AKE** or may be obtained from the NEC Chairman. Send completed forms to: Rachel Rogers, METROZOO, 12400 S.W. 152 St., Miami, FL 33177.

Nominator Form for
AAZK Board of Directors

Qualifications for Nomination:

- 1) Nominee must be a Professional Member of AAZK and must have been a member of the Association for at least one year.
- 2) Nominee must be presently employed as an animal keeper/attendant by a recognized zoological institution or aquarium in the U.S. or Canada and must have been in the zoological field for at least two years.

1. Name of Nominee _____

Address: _____

Phone: _____

Institution: _____

2. State in 150 words or less the reason(s) why the nominee warrants election to the AAZK Board of Directors.

3. Signature of Nominator: _____

4. Form must be received by the NEC Chairperson by 31 January 1989. Send to: Rachel Rogers, NEC Chair, METROZOO, 12400 152 St., Miami, FL 33177.

Nominee Biographical Form for AAZK Board of Directors

1. Name _____

Address: _____

Phone: _____

PLEASE LIST THE FOLLOWING INFORMATION;

2. Professional Background: (places of employment, length of service, titles)

3. Membership in AAZK:

a) National: number of years _____

Activities:

b) Local Chapter(s): number of years, offices held, involvement in activities.

4. Educational Background:

Nominee Biographical Form/AAZK Board of Directors, *Continued*

5. Memberships in Affiliate Organizations: (AAZPA, Audubon, etc.)

6. Other information the nominee feels to be pertinent.

7. References (one or two): give name, address and phone number where they can be reached.

8. Nominee's Signature: _____

9. Form must be received by NEC Chair by 31 January 1989. Send form to: Rachel Rogers, NEC Chair, METROZOO, 12400 152 St., Miami, FL 33177.

1988 American Association of Zoo Keeper Awards

The following awards were presented at the 14th National AAZK Conference held in Tucson, AZ from 11-15 September. The Excellence in Zoo Keeping, Meritorious Achievement and Certificate of Merit for Zoo Keeper Education Awards are selected by the AAZK Awards Committee from nominations proposed by the AAZK membership. Rachel Rogers of the Miami Metrozoo chaired the Awards Committee this year. The Excellence in Journalism Awards are selected by the editorial staff of *Animal Keeper's Forum*.

1988 Excellence in Zoo Keeping Award Winners

In recognition of their professional attitude, true dedication, superb application of animal husbandry practices, and contribution to the welfare of the animal life placed in their charge, AAZK presents the following individuals with this award:

Ralph Arrison, Washington Park Zoo, Portland, OR

*Awarded for his outstanding avian husbandry techniques and for his assistance in the redesign of Washington Park's Water Ouzel (*Cinclus mexicanus*) exhibit.*

Kevin Conway, NZP Conservation & Research Center, Front Royal, VA

*Awarded for his refinements to Red Panda (*Ailurus fulgens*) management. Mr. Conway is distinguished by his efforts which produced the first births of Tiger Quolls (*Dasyurus maculatus*) outside of Australia. He also served as President of AAZK (1984-1986) making improvements in the organization which have encouraged a better rapport with the AAZPA.*

David Haring, Duke University Primate Center, Durham, NC

*Awarded for his work with the management and husbandry of prosimian primate species; in particular, efforts leading to the improved health and reproductive success with Sifakas (*Propithecus sp.*) and Tarsiers (*Tarsius sp.*) at the Duke Primate Center.*

Cathy Hudson, Metrozoo, Miami, FL

Awarded for her standard-setting dedication and observation of exotic animal care. Her team building efforts lead to the rehabilitation of a red kangaroo with a spinal cord injury.

Kit Niemann, Point Defiance Zoo & Aquarium, Tacoma, WA

Awarded for her extreme dedication in the husbandry and educational use of animals in her care. Ms. Niemann is also distinguished by having gentled for halter breaking llamas and musk ox for public view.

Robert Terracuso, New York Zoological Park, Bronx, NY

Awarded for his outstanding dedication in the Mammal Department of the New York Zoological Society (Bronx Zoo).

Rachel Rogers, Metrozoo, Miami, FL

*Awarded for her outstanding husbandry of primate species in her care. Ms. Rogers is distinguished for her contributions to Ruffed Lemur (*Varecia variegata*) management at her zoo. She has also served as a member (1984), then chair (1985-88) for the AAZK Awards Committee and at a local level with the South Florida AAZK Chapter.*

AAZK Meritorious Achievement Award Winner

In recognition of outstanding achievement in the field of wildlife conservation and animal husbandry, AAZK presents this award to:

Scott Fuller, Metrozoo, Miami, FL

Awarded for his contributions to wildlife and conservation education of the public in an overnight program called "Zoo Inn". This program, as well as a Scout Patch program 'Awareness/Interest/Respect (AIR) for wildlife, is sponsored by the Zoological Society of Florida.

Certificate of Merit for Zookeeper Education

In recognition of the outstanding achievement by an institution in establishing and promoting zoo keeper education at their facility, AAZK presents this award to:

The Mill Mountain Zoological Park, Roanoke, VA

Awarded for their outstanding support of continuing education, financial assistance to attend conferences and of the local AAZK Chapter. This zoo is maintained on a very limited budget, but ensures their keeper staff an opportunity to learn.

Woodland Park Zoological Garden, Seattle, WA

Awarded for pioneering an excellent workshop "Applying Behavioral Research to Zoo Animal Management". The workshop evolved from a keeper training program held at WPZ. Michael Hutchins (NYZS) and Carolyn Crockett (WPZ) are developers and instructors of the workshop. The Dallas Zoo is recognized for participation as the Host Institution for 1988.



From Outgoing Awards Committee Chair Rachel Rogers

This year's award nominations review has come to an end and awards were presented at the Tucson Conference to successful nominees. Now the AAZK Awards will reach those animal keepers in "related facilities", such as full-time employees of any North American zoo, park, aquarium, animal reserve or any animal care facility.

I also regret to announce my resignation as Chairperson of the AAZK Awards Committee. In the years since my appointment in 1984, as a committee member, then in 1985, as committee Chair, I have enjoyed the work. I am happy to say all those involved have worked well as a group and WE have accomplished a lot!

Awards, Continued

I urge any member of the Association to try some type of committee work to broaden your awareness of our zoos in North America and to see how AAZK can benefit our professional peers. My enthusiasm for working in a national capacity for AAZK continues and I will hopefully be able to fulfill my desires to do so again. (*Rachel has recently accepted the position as Chair of the Nominations & Elections Committee. Ed.*)

I would like to thank and recognize the members of the 1988 AAZK Awards Committee:

Susan Bunn, Minnesota Zoological Garden
Harry Hofauer, Metro Toronto Zoo
Carolyn Horton, Metrozoo (Miami)
John Kiseda, New York Zoological Park (Bronx Zoo)
Oliver Claffey, Metro Toronto Zoo/Board Overseer
Brandy Pound, San Francisco Zoological Society/AAZP Liaison

Thank You

Rachel Rogers, Chair
AAZK Awards Committee
Metrozoo, Miami, FL

Excellence in Journalism Awards

Outstanding Mammal Article: "Hand-Rearing and
Reintroduction of a Mandrill Baboon

Jill Hickey and Leslie Wood
Reid Park Zoo, Tucson, AZ

Outstanding Herpetology Article: "Sloughing and Feeding in
Captive Young Russel's Vipers"

Dr. S. Paulraj and S. Subbarayalu Naidu
Arignar Anna Zoological Park, Madras, India

Outstanding Research Article: "A Survey of Intestinal Parasites in
Wild, Ex-Captive and Captive Orangutans"

Harmony Frazier-Taylor
Woodland Park Zoological Garden, Seattle, WA
Dr. Birute Galdikas
Tanjung Puting Reserve, Indonesia
Dr. William R. Karesh, DVM
Woodland Park Zoological Garden, Seattle, WA

Outstanding Avian Article: "Husbandry and Behavior of the
Hamerkop at the Dallas Zoo"

Jamie Crane
Dallas Zoo, Dallas, TX

Outstanding Exhibit Article: "Sizing Up Graphics"

Mike Seidman
Phoenix Zoo, Phoenix, AZ

Awards, Continued

Outstanding Veterinary Article: "Treatment and Management of Chronic Foot Problems in an Indian Rhinoceros"

Cyd P. Mayer and Ellen Saksefski
Milwaukee County Zoological Gardens, Milwaukee, WI

Outstanding Husbandry Article: "Small Antelope Capture and Restraint"

David Luce
Dallas Zoo, Dallas, TX

Outstanding Narrative Article: "First We Get Moose and Squirrel: A History of Meese in America"

David Thornton
Chicago Zoological Park, Brookfield, IL

Outstanding Cover Art: "Chinese Golden Monkey and Baby"
May 1988 issue

Elayne Barclay
Washington Park Zoo, Portland, OR

Honorable Mention Awards

"The Successful Introduction and Resocialization of Chimpanzees", **Leslie Field**, Sacramento Zoo, Sacramento, CA. (Mammal Category)

"Snow Leopard Breeding & Births at the Bronx Zo's Himilayan Highlands", **Anthony P. Brownie and Martin W. Zybura**, Bronx Zoo, Bronx, NY. (Mammal Category)

"Captive Reproduction of the Bermuda Rock Lizard or Skink", **John A. Barnes and Frances Edy**, Bermuda Aquarium, Museum & Zoo, Bermuda. (Herpetology Category)

"How to Foil Potoroos and Have Green Plants in Your Exhibits", **Dee Sliney and Judie Steenberg**, Woodland Park Zoological Garden, Seattle, WA. (Research Category)

"Destined for Survival: A Papua New Guinea Expedition", **Kimberly Livingston**, Metrozoo, Miami, FL. (Avian Category)

"Angel-Wing in Waterfowl", **Mike Taylor**, White Oak Plantation, Yulee, FL. (Veterinary Category)

"Notes on the Management of Fisher at Burnet Park Zoo", **Tom LaBarge**, Burnet Park Zoo, Syracuse, NY. (Husbandry Category)

"Management and Breeding of Tiger Quolls in Captivity", **Kevin Conway**, NZP Conservation & Research Center, Front Royal, VA. (Husbandry Category)

"Kenya Diary: A Negare Sergoi Journal", **Andy Lodge**, Columbus Zoo, Columbus, OH. (Narrative Category)

"Bighorn Sheep" Cover June 1988. **Cherie Langlois**, Northwest Trek, Eatonville, WA. (Cover Art Category)

"AAZK 20th Anniversary" Cover October 1987. **Yoshi, Yonetani**, Zoo/DEL, Zoo Design & Education Lab, Kobe, Japan. (Cover Art Category)



An Encouraging Word

Fish and Wildlife Service Commits \$50,000 For Elephant Conservation in Africa

The Interior Department's U.S. Fish and Wildlife Service has committed \$50,000 as the first donation in a national effort to raise up to \$4 million to support conservation programs for the African elephant, Director Frank Dunkle has announced.

Dunkle said his agency will earmark \$50,000 toward a cooperative effort to bolster elephant conservation programs in Africa. He noted that the World Wildlife Fund has pledged to match up to \$2 million in Federal funds for this purpose.

"We hope the Service's modest outlay will act as a catalyst to inspire contributions from the conservation community and private business to improve the prognosis for the African elephant, populations of which have declined by as much as 50% in the wild in the past decade," Dunkle said. Additional financial support may be available from the National Fish and Wildlife Foundation, he said. The Congressionally-chartered foundation underwrites various wildlife management projects, including some by the USFWS.

In a June hearing before the Subcommittee on Fisheries and Wildlife Conservation and the Environment of the House Committee on Merchant Marine and Fisheries, the World Wildlife Fund proposed to raise up to \$2 million for elephant conservation if Congress would authorize a similar amount in the next year. WWF estimates that at least \$4 million per year in each of the next three years would be required from non-African sources to adequately support elephant conservation programs on that continent.

U.S. support for such programs would include direct financial aid to wildlife agencies of ivory-poaching nations, providing equipment and technical assistance to those organizations, and strengthening the anti-poaching units of nations where illegal hunting of elephants continues.

An estimated 760,000 elephants remain in the wild in Africa, down from approximately 1.5 million a decade ago. Ivory poaching and degradation and disappearance of habitat have been blamed for this decline.

As a Federally designated "threatened" species and an "Appendix II" species under CITES, African elephants and their ivory and other products may be legally traded under certain controls. Under a CITES ivory trade control system, annual raw ivory export quotas are set and tusks must be marked in an effort to control poaching and verify the legality of ivory in international commerce.

Pending legislative proposals call for stronger controls on the trade in African elephant ivory, including a total ban on elephant products coming into the United States. The USFWS has testified against such a ban at this time, suggesting that such unilateral action would have no significant effect on the international trade in ivory and could undermine the efforts of African nations to control poaching and illegal trade under existing CITES controls.

"We believe we can more effectively bolster the existing efforts of the various African nations with an immediate infusion of financial support and technical assistance, rather than erecting a trade barrier that may produce little incentive for those countries to manage elephants through limited harvesting, Dunkle said. "Most elephant trade experts and conservation groups agree that a ban could be counterproductive. That is why we believe a large-scale cooperative venture is the right way to begin."

*--Department of the Interior News Release
July 1988*

Chapter News

Brookfield Zoo AAZK Chapter

We began this summer with a very successful silent auction raising \$1400. We continued to show support for conservation on both a national and international level by donating \$100 each to Monte Verde Conservation League, Northern Rockies Conservation Cooperative and Willowbrook Wildlife Refuge, here in Illinois. We are working now on supporting a Species Survival Plan involving a species Brookfield is propagating.

We've continued to have speakers at our monthly meetings. In July Dr. Barbara Birney gave a presentation on Costa Rica. Most recently Rose Scola, the registrar at Brookfield, elaborated on her duties with animal import, export and the ISIS.

"What Kind of Animal Are You?", a collection of zoo stories edited by John Stoddard, was financed by the Brookfield AAZK Chapter. Proceeds from the book will be divided between the Brookfield Chapter and National AAZK. You may order a copy by sending your name and complete mailing address, along with a check or money order made payable to "Brookfield AAZK Chapter" to: Brookfield Zoo Chapter, 3300 Golf Road, Brookfield, IL 60513. Cost of each book is \$4.20 which includes postage.

*---Colleen Kinzley
Pres., Brookfield Chapter*

San Diego Chapter AAZK

Due to other commitments within the Society, Vice President Randy Rieches and Craig Racicot have stepped down from their positions on the Board of Directors of the San Diego AAZK Chapter. Filling the vacated Board positions are Sea World Senior Animal Care Specialist Nolan Harvey and Zoo Education Programmer Debra Erickson, who had the next highest number of votes in the January election.

On 28 July the Chapter held their annual hot dog roast at the Mombasa Pavillion at the San Diego Wild Animal Park. The Chapter continues to have guest speakers which have included Curator of Birds Alan Liberman, who spoke on conservation in Latin America; and Dr. Jim Oosterhuis who spoke on "Lameness and Orthopedics".

The Chapter will be holding their 4th Annual Amateur Photo Contest in November.

*--The Keeper Newsletter
August 1988*

Greater San Francisco Bay Area AAZK

On 21 June, the longest day of the year, the members of the Chapter held a Summer Solstice Party at the Oakland Zoo's Snow Building. The theme for this event was a "60's Summer of Love". Instead of the usual Chapter meeting discussions on conservation and research, Chapter members discussed such topics as surfing, Motown and flower power. The evening included a catered Italian buffet, 60's music and lots of good conversation.

The Chapter has maintained a high level of professionalism by providing programs and lectures on a wide range of topics including: Capture Techniques and Management of Wild Elk, Bighorn Sheep, and Pronghorn Antelope in California; The Status of Five Rhinoceros Species in Captivity; Simian A.I.D.S. in Captivity; Endocrinology of Zoo Animals; Introduction and Resocialization of Chimpanzees at the Sacramento Zoo; Husbandry and Maintenance of Magellanic Penguins at the San Francisco Zoo; Rehabilitation of Sea Otters at the Monterey Bay Aquarium; How Training Animals at Marine World/Africa USA Facilitates Veterinary Care; Primate Research on the Mentawai Islands of Indonesia; and The Use of Animals in Biomedical Research.

The Chapter has also developed a three-part Zoo Medicine for Zoo Keepers Medical Symposium Series. The symposia covered basic medical terminology, common diseases, clinical

Chapter News, *Continued*

signs, treatment, common parasites, necropsy procedures, plus a demonstration of chemical immobilization equipment and techniques.

The Chapter also continues to work on the revision and expansion of **Biological Values III**. This important reference work represents the cooperative efforts of zoo keepers, curators, volunteers and institutions.

The GSFBA Chapter currently has 130 plus members from seven zoological facilities which include San Francisco Zoo, Oakland Zoo, San Jose Zoo, Sacramento Zoo, Marine World/Africa USA, Fresno Zoo and the Micke Grove Zoo. They produce a bimonthly newsletter entitled **Species** and have recently adopted a new Chapter logo. The logo was designed by Chapter member Tim Hurley.



Newly elected officers for the GSFBA Chapter are:

President.....Leslie Field
Vice Pres.....Norman Gershenz
Secretary.....Debbie Reaves
Treasurer.....David Bocian
Board Rep.....Irene Donovan

---*Species Newsletter*
May/June 1988



Opportunity Knocks...but only a little this month

Institutions wishing to advertise employment opportunities are asked to send pertinent data by the 15th of each month to: Opportunity Knocks/AKE, 635 Gage Blvd., Topeka, KS 66606. Please include closing dates for positions available. There is no charge for this service and phone-in listings of positions which become available close to deadline are accepted.

ZOOKEEPER...requires high school diploma. Paid zoo experience desirable. Good communication skills essential. Salary \$12,870.00 per year plus benefits. Send resume and references to: Soco Gardens Zoo, Route 1, Box 355, Maggie Valley, NC 28751.

SMALL MAMMAL KEEPER...requires two years experience with small mammals, preferably insectivores, rodents, bats and callithrichides. Responsible for husbandry, record keeping, handling, nutrition, and exhibit design for large collections of small mammals. Send resume and letter detailing experience and career goals, with three letters of recommendation by **1 October, 1988** to: Karl R. Kranz, Curator of Mammals, Philadelphia Zoological Garden, 34th Street and Girard Avenue, Philadelphia, PA 19104. Salary approx. \$20,000 plus benefits.

Discovery Channel Goes Down Under to Explore "Land of Parrots"

Australia is home to one-sixth of the world's species of parrots. In addition, Australia has the most diverse range of these flamboyant birds, many of which are found nowhere else in the world. Beginning Tuesday, 4 October, The Discovery Channel will present the U.S. premiere of "Land of Parrots" as part of its ongoing Secrets of Nature anthology. This visually absorbing, seven-part series will feature weekly one-hour programs about Australia's most colorful fauna.

Following is the schedule of episodes for "Land of Parrots". **Please note** that all times listed are Eastern Standard and check your local cable listings for times in your area.

<u>EPISODE</u>	<u>AIR DATE</u>	<u>AIR TIME</u>
Lorikeets	Tue. 10/04	2:00 AM
	Wed. 10/05	10:00 PM
	Sat. 10/08	NOON
Black Cockatoos	Tue. 10/11	2:00 AM
	Wed. 10/12	10:00 PM
	Sat. 10/15	NOON
White Cockatoos	Tue. 10/18	2:00 AM
	Wed. 10/19	10:00 PM
	Sat. 10/22	NOON
New Arrivals	Tue. 10/25	2:00 AM
	Wed. 10/26	10:00 PM
	Sat. 10/29	NOON
Specialists	Tues. 11/01	2:00 AM
	Wed. 11/02	10:00 PM
	Sat. 11/05	NOON
Rosellas	Tues. 11/08	2:00 AM
	Wed. 11/09	10:00 PM
	Sat. 11/12	NOON
Grass Parrots	Tue. 11/15	2:00 AM
	Wed. 11/16	10:00 PM
	Sat. 11/19	NOON



Pamela Sardinas Campa - 1980

Bird Feeding Hierarchies in Mixed Species Exhibits at the Bronx Zoo

By

Danny Brooks, Keeper Intern
Bronx Zoo, Bronx, NY

The Bronx Zoo's World of Birds building contains two public walks - one being South American rainforest, and the other African jungle. In each exhibit, an investigation was done to observe which birds fed in which order.

The following is a census of the species in each exhibit:

<u>Abbv.</u>	<u>South American Exhibit</u>
R.T.	3.2 ringtail (<i>Callonetta leucophrys</i>)
H.C.	1.1 helmeted currawong (<i>Crax pavai</i>)
M.D.	0.1 mountain witch dove (<i>Geotrygon versicolor</i>)
S.M.	0.1 Sclater's motmot (<i>Momotus momta microstephanus</i>)
B.A.	0.0.1 black-necked aracari (<i>Pteroglossus aracari</i>)
C.R.	1.1 Bolivian cock-of-the-rock (<i>Rupicola peruviana saturata</i>)
T.	0.0.2 troupial (<i>Icterus icterus</i>)
B.T.	0.0.2 blue-shouldered mountain tanager (<i>Anisognathus f. flaviruca</i>)
S.T.	0.0.1 silver-beaked tanager (<i>Ramphocelus flammigerus</i>)
S.B.T.	0.0.14 southern blue tanager (<i>Thraupis virens cana</i>)
B.C.	0.0.2 Brazilian cardinal (<i>Paraoria coronatha</i>)

<u>Abbv.</u>	<u>African Exhibit</u>
H.S.	1.1 hammerhead stork (<i>Scopus umbretta</i>)
H.T.	2.0 Hottentot teal (<i>Anas punctata</i>)
P.G.	1.3 African pigmy geese (<i>Nettapus auritus</i>)
C.P.	1.1 Congo peafowl (<i>Afropavo congensis</i>)
B.S.	0.0.2 black-winged stilt (<i>Himantopus h. himantopus</i>)
V.T.	1.2 Violaceous touraco (<i>Musophaga violacea</i>)
L.R.	1.0 lilac-breasted roller (<i>Coraclis c. caudata</i>)
C.H.	1.1 common hoopoe (<i>Upupa epops</i>)
R.H.	0.1.1 red-bill hornbill (<i>Tokus erythrorhynchus</i>)
L.B.	1.1 Levaillant's barbet (<i>Trachphonus vaillantii</i>)
G.S.	1.0.3 golden-breasted glossy starling (<i>Coccyzus r. regius</i>)
S.S.	1.1 superb glossy starling (<i>Spreo superbus</i>)
R.W.	1.0 rufous-necked weaver (<i>Ploceus cucullatus</i>)

Observations

Data was collected daily from 12 July-5 August 1987 between 1-2:30 p.m. at the afternoon feeding. Observation data was collected by species rather than individual birds. The birds observed exhibited a wide assortment of behaviors. Fifteen behavior activities were selected which emphasize hierarchy. Behavior types were divided into three groups to indicate dominant, submissive or neutral behavior. The latter was used for behavior which did not display dominance or submission in a particular situation. The behavior activities selected are as follows:

Bird Feeding Hierarchies in Mixed Species Exhibits, *Continued*

<u>Abbv.</u>	<u>Dominant (D)</u>
L.F.	Landing at feeder (or walking if terrestrial)
C.F.D. →	Causing different species to flee
C.F.S.	Causing sibling species to flee
C.U.D. →	Causing different species to reposition, almost flee, be uncomfortable, etc.
C.U.S.	Causing sibling species to reposition, almost flee, be uncomfortable, etc.
<u>Abbv.</u>	<u>Submissive (S)</u>
M.F.	Flies towards, but misses feeder
C.A.	Checking area around feeder or from feeder to other birds, etc.
F.D. →	Fleeing hurriedly from different species
F.S.	Fleeing hurriedly from sibling species
U.D. →	Uncomfortable (repositioning, flying away after a moment, going to another part of the same branch, etc.) due to a different species' presence.
U.S.	Uncomfortable (repositioning, flying away after a moment, going to another part of the same branch, etc.) due to a sibling species' presence.
<u>Abbv.</u>	<u>Neutral (N)</u>
H. →	No aggression towards a different species within fighting range (Harmonizing)
S.F.S.	Species feeding sibling species
A.D. →	Physical aggression between different species (pecking, fighting, threat display, etc.)
A.S.	Physical aggression between sibling species (pecking, fighting, threat displays, etc.)

The observation data will be given in the order it was collected. Percentages for dominant, submissive, or neutral will be given for each species as follows:

South American Exhibit

<u>Ringed teal</u>	<u>D</u>	<u>S</u>	<u>N</u>
L.F. 1	2	3	3
U.D. → H.C. 11			
H. H.C. 11	4.0	2.66	2.66
A.D. → H.C. 11			
F.S. 1	25.0%	37.59%	37.59%
C.F.S. 1			
<u>Helmeted currawow</u>	<u>D</u>	<u>S</u>	<u>N</u>
C.F.D. → S.B.T. 111	14	--	3
L.F. 1111 111			
A.D. → R.T. 1	1.21	0	5.66
C.F.D. → R.T. 11			
H. → R.T. 11	82.64%	0%	17.66%
C.U.D. → C.R. 1			
<u>Mountain witch dove</u>	<u>D</u>	<u>S</u>	<u>N</u>
L.F. 1	1	2	--
F.D. → C.R. 1	3.0	1.5	0
C.A. 1	33.3%	66.6%	0%

Bird Feeding Hierarchies in Mixed Species Exhibits. *Continued*

<u>Slater's motmot</u>	<u>D</u>	<u>S</u>	<u>N</u>
U.D. → S.B.T. 1	1	1	--
L.F. 1	2.0	2.0	0
	50%	50%	0%
<u>Black-necked aracari</u>	<u>D</u>	<u>S</u>	<u>N</u>
CA. 111	10	6	3
L.F. 1111			
C.U.D. → B.T. 1	1.25	7.5	15.0
C.F.D. → S.B.T. 11			
C.F.D. → C.R. 1	80%	13.3%	6.6%
H. → T. 1			
C.U.D. → S.B.T. 11			
<u>Bolivian Cock-of-the-Rock</u>	<u>D</u>	<u>S</u>	<u>N</u>
CA. 1111	10	6	3
L.F. 1111 11			
C.F.D. → S.B.T. 11	1.9	3.1	6.33
H. → S.B.T. 111			
C.F.D. → M.D. 1	52.63%	32.25%	15.79%
F.D. → BA. 1			
U.D. → H.C. 1			
<u>Troupial</u>	<u>D</u>	<u>S</u>	<u>N</u>
L.F. 111	9	1	2
F.D. → BA. 1			
C.F.D. → S.B.T. 11	1.3	12.0	6.0
H. → BA. 1			
C.F.D. → B.T. 1	75.18%	8.3%	16.6%
C.F.D. → B.C. 1			
C.F.D. → S.T. 1			
H. → S.B.T. 1			
<u>Blue-shouldered mountain tanager</u>	<u>D</u>	<u>S</u>	<u>N</u>
U.D. → BA. 1	7	3	2
L.F. 1111 1			
H. → B.C. 1	1.71	4.0	6.0
FA. 1			
C.F.S. 1	58.47%	25.0%	16.6%
F.D. → T. 1			
H. → S.T. 1			
<u>Silver-beaked tanager</u>	<u>D</u>	<u>S</u>	<u>N</u>
L.F. 111	6	2	3
C.F.D. → S.B.T. 1			
C.U.D. → S.B.T. 1	1.83	5.5	3.6
H. → S.B.T. 1			
CA. 1	54.64%	18.18%	27.32%
AD. → B.C. 1			
C.U.D. → B.C. 1			
H. → B.T. 1			
F.D. → T. 1			
<u>Southern blue tanager</u>	<u>D</u>	<u>S</u>	<u>N</u>
M.F. 1	20	37	13
F.D. → H.C. 1			
L.F. 1111 1111 1111 11	3.5	1.79	6.36

Bird Feeding Hierarchies in Mixed Species Exhibits. *Continued*

F.S. 1			
CA. 1111 1111			
1111 1111 1111 1	28.57%	55.86%	15.72%
AS. 1111			
S.F.S. 1	H. → T. 11		
H. → B.C. 1	C.F.A. 1		
F.D. → C.R. 11	H. → B.T. 1		
H. → C.R. 11	H. → S.T. 1		
C.U.D. → S.M. 1	U.D. → S.T. 1		
F.D. → BA. 111			
F.D. → T. 1			
C.F.D. → B.C. 1			
F.D. → S.T. 1			
U.D. → BA. 1			

Brazilian cardinal

	<u>D</u>	<u>S</u>	<u>N</u>
LF. 1	1	3	2
F.D. → S.B.T. 1			
H. → B.T. 1	6.0	2.0	3.0
AD. → S.T. 1			
U.D. → S.T. 1	16.6%	50.0%	33.3%
F.D. → B.C. 1			

African Exhibit

Hammerhead Stork

	<u>D</u>	<u>S</u>	<u>N</u>
LF. 1	11	4	1
U.D. → C.P. 11			
C.U.D. → C.P. 1	1.45	4.0	16.0
C.F.D. → B.S. 11			
C.F.D. → P.G. 111	68.75%	25.0%	6.25%
C.U.D. → L.B. 1			
C.F.D. → C.H. 1			
C.F.D. → G.S. 1			
F.D. → C.P. 1			
H. → H.T. 1			
C.U.D. → H.T. 1			
F.D. → B.S. 1			

Hottentot teal

	<u>D</u>	<u>S</u>	<u>N</u>
C.F.D. → P.G. 1	5	1	1
C.U.D. → P.G. 1111	1.4	7.0	7.0
H. → H.S. 1			
U.D. → H.S. 1	71.42%	14.28%	14.28%

African pigmy goose

	<u>D</u>	<u>S</u>	<u>N</u>
F.D. → H.T. 1	6	4	3
U.D. → C.P. 11	2.16	3.25	4.3
C.U.D. → B.S. 1			
AD. → B.S. 1	46.15%	30.76%	23.07%
H. → C.P. 1			
AD. → C.P. 1			
F.S. 1			
C.F.S. 1			
F.D. → H.S. 111			
F.D. → B.S. 1			

Bird Feeding Hierarchies in Mixed Species Exhibits. *Continued*

<u>Congo peafowl</u>			
LF. 1	<u>D</u> 7	<u>S</u> 1	<u>N</u> 3
C.U.D. → H.S. 11			
C.U.D. → P.G. 11	1.57	11.0	3.6
H. → P.G. 1			
AD. → P.G. 1	63.69%	9.09%	27.27%
UD. → H.S. 1			
C.U.D. → B.S. 1			
C.F.D. → B.S. 1			
H. → C.H. 1			
<u>Black-winged stilt</u>			
	<u>D</u> 4	<u>S</u> 4	<u>N</u> 1
LF. 1			
AD. → P.G. 1	2.25	2.25	9
UD. → P.G. 1			
F.D. → H.S. 11	44.4%	44.4%	11.1%
C.F.D. → C.H. 1			
F.D. → C.P. 1			
C.F.D. → P.G. 1			
C.F.D. → H.S. 1			
<u>Violaceous touraco</u>			
	<u>D</u> 9	<u>S</u> 3	<u>N</u> --
LF. 1111			
F.D. → RW. 1	1.3	4.0	0
UD. → RH. 1			
C.U.S. 1	75.0%	25.0%	0%
C.U.D. → G.S. 1			
C.U.D. → RW. 1			
C.U.D. → LR. 1			
F.D. → C.H. 1			
<u>Lilac-breasted roller</u>			
	<u>D</u> 1	<u>S</u> 1	<u>N</u> --
UD. → VT. 1			
C.F.D. → RH. 1	2.0	2.0	0
	50.0%	50.0%	0.0%
<u>Common hoopoe</u>			
	<u>D</u> 8	<u>S</u> 4	<u>N</u> 1
C.F.D. → VT. 1			
C.U.D. → LB. 11	1.62	3.25	13.0
C.U.D. → G.D. 111			
LF. 1	61.72%	30.76%	7.69%
F.D. → H.S. 1			
F.D. → B.S. 111			
H. → C.P. 1			
C.F.D. → G.S. 1			
<u>Red-billed hornbill</u>			
	<u>D</u> 16	<u>S</u> 1	<u>N</u> --
LF. 1111			
C.U.D. → G.S. 1			
C.F.D. → LB. 11	1.06	17.0	0
C.F.D. → G.S. 111			
C.F.D. → RW. 111	94.3%	5.8%	0%
C.U.D. → VT. 1			
C.U.D. → LB. 1			
F.D. → LR. 1			
C.F.D. → S.S. 1			

Bird Feeding Hierarchies in Mixed Species Exhibits, *Continued*

<u>Levaillant's barbet</u>	<u>D</u>	<u>S</u>	<u>N</u>
M.F. 1	2	7	1
U.D. → C.H. 11	5.0	1.42	10.0
H. → G.S.			
U.D. → G.S. 1	20.0%	70.42%	10.0%
AD. → G.S. 1			
F.D. → R.H. 1			
C.F.D. → G.S. 1			
U.D. → R.H. 1			
U.D. → H.S. 1			

<u>Gold-breasted starling</u>	<u>D</u>	<u>S</u>	<u>N</u>
LF. 1111 11	15	14	2
U.D. → R.H. 11	2.06	2.21	15.5
U.D. → C.H. 11			
H. → L.B. 1	48.38%	45.24%	6.45%
C.U.D. → L.B. 1			
C.U.S. 1111			
AD. → L.B. 1			
U.S. 1111			
F.D. → R.H. 11			
M.F. 1			
C.F.D. → S.S. 11			
F.D. → H.S. 1			
F.D. → L.B. 1			
U.D. → V.T. 1			

<u>Superb starling</u>	<u>D</u>	<u>S</u>	<u>N</u>
	4	5	--
C.F.D. → R.W. 1			
LF. 11	2.25	1.8	0
C.F.S. 1			
F.S. 1	44.4%	55.5%	0.0%
F.D. → G.S. 11			
U.D. → G.S. 1			
F.D. → R.H. 1			

<u>Rufous-necked weaver</u>	<u>D</u>	<u>S</u>	<u>N</u>
	7	6	--
F.D. → S.S. 11			
LF. 1111 1	1.85	2.16	0.
F.D. → R.H. 111			
F.D. → H.S. 1	54.05%	46.15%	0.0%
C.F.D. → V.T. 1			
U.D. → V.T. 1			

Variables

Many of the behaviors displayed were due to variables which do not occur in the wild. Working in captive conditions has different results than if the experiment were done with wild populations. Size and aggressiveness are the major variables which distinguish dominance from submission. Increased numbers of a species present as well as pair bondings, breeders protecting nest or young, and losing a mate are all important factors which can bring out aggressive behavior. Age is controversial, in that a fledgling or an extremely old bird are usually picked on while young breeders have the tendency to be quite robust. Other variables were due to captive situations, such as my own and the public's presence, a rain shower in the South American exhibit occurring daily from 2:00 to 2:15 p.m., and consecutive feeding times at 6:00 a.m. and 1:00 p.m.

Bird Feeding Hierarchies in Mixed Species Exhibits. *Continued*

Conclusions

In conclusion, it was observed in two different exhibits that feeding hierarchies do exist. Besides size and other general variables, there are many sub-variables which should be taken into consideration. Also balances should be taken into consideration. For example, it is apparent that a congo peafowl is much more powerful than a violaceous touraco. The peafowl is a much more sociable bird and does not need to be aggressive because of its size, etc. The touraco is a very highly strung bird which frequently lands at feeders and takes off again. A bird like the touraco is rarely seen in the company of other species of birds. Hierarchy ladders are shown below indicating from greatest to least in dominance, submission, or neutral behaviors.

DOMINANCE

South American Exhibit

82.64%	helmeted currawong
80.0%	black-necked aracari
75.18%	troupial
58.37%	blue-shouldered mountain tanager
54.64%	silver-beaked tanager
52.63%	Bolivian cock-of-the-rock
50.0%	Sclater's motmot
33.3%	mountain witch dove
28.57%	southern blue tanager
25.0%	ring teal
16.6%	Brazilian cardinal

African Exhibit

94.3%	red-billed hornbill
75.0%	violaceous touraco
71.42%	Hottentot teal
68.75%	hammerhead stork
63.69%	Congo peafowl
61.72%	common hoopoe
54.05%	rufous-necked weaver
50.0%	lilac-breasted roller
48.38%	golden-breasted glossy starling
46.15%	African pigmy goose
44.4%	black-winged stilt and superb sprea
20.0%	Levaillant's barbet

SUBMISSION

South American Exhibit

66.6%	mountain-witch dove
55.86%	southern blue tanager
50.0%	Sclater's motmot and Brazilian cardinal
37.59%	ring teal
32.25%	Bolivian cock-of-the-rock
25.0%	blue-shouldered mountain tanager
18.18%	silver-beaked tanager
13.3%	black-necked aracari
8.3%	troupial
0.0%	helmeted currawong

Bird Feeding Hierarchies in Mixed Species Exhibits. *Continued*

African Exhibit

70.42%	Levaillant's barbet
55.5%	superb starling
50.0%	lilac-breasted roller
46.15%	rufous-necked weaver
45.24%	golden-breasted glossy starling
44.4%	black-winged stilt
30.76%	African pigmy goose and common hoopoe
25.0%	Violaceous touraco and hammerhead stork
14.28%	Hottentot teal
9.09%	Congo peafowl
5.8%	red-billed hornbill

NEUTRAL

South American Exhibit

37.59%	ring teal
33.3%	Brazilian cardinal
27.32%	silver-beaked tanager
17.66%	helmeted currawong
16.6%	troupiial and blue-shouldered mountain tanager
15.79%	Bolivian cock-of-the-rock
15.72%	southern blue tanager
6.6%	black-necked aracari
0.07%	mountain witch dove and Sclater's motmot

African Exhibit

27.2%	Congo peafowl
23.07%	African pigmy goose
14.28%	Hottentot teal
11.1%	black-winged stilt
10.0%	Levaillant's barbet
7.69%	common hoopoe
6.45%	golden-breasted glossy starling
6.25%	hammerhead stork
0.0%	violaceous touraco, lilac-breasted roller, red-billed hornbill, superb starling, rufous-necked weaver



Keeper's Alert....CAUZ Directories Available

The Consortium of Aquariums, Universities and Zoo has just published its Directory of its members. The book cross-references in several ways to indicate the area of research in which its members are involved. The cost of the directory is \$10.00. It may be ordered by sending your name and complete mailing address along with a check or money order made payable to "C.S.U.N. Trust Fund" to: Donna FitzRoy Hardy, PhD., Department of Psychology, California State University Northridge, 1811 Nordhoff St., Northridge, CA 91330.

AAZK Regional Coordinators

Co-Directors of Regional Coordinator System

States East of Mississippi - Diane Krug, Rt. 1, Box 273, Hilliard, FL 32097 (904) 225-9559 [work]
(904) 845-4279 [home]

States West of Mississippi - Debbera Stecher, Woodland Park Zoo, 5500 Phinney Ave., North, Seattle, WA
98103. (206) 625-5402 [work] (206) 745-8198 [home]

REGIONAL COORDINATORS

VACANCY - for the states of ME, VT, NH, MA, RI, CT

Peter Buchholz, Bronx Zoo, New York, NY 10460 (212) 220-5154 [w] (718) 229-7711 [h]
for the states of NY, VA

VACANCY - for the states of PA, DE, NJ, MD and the District of Columbia

Bill Whittaker, Toledo Zoological Gardens, Toledo, OH 43609

for the states of MI, IN, KY, and OH

Chris Garland, North Carolina Zoological Park, Asheboro, NC 27203

for the states of NC, SC, TN, and W. VA

Larry Sammarco, Lincoln Park Zoo, Chicago, IL 60614 (312) 294-4660 [w]

for the states of WI, IL, MO, MN, and IA

Tim Kurkowski, Zoo Atlanta, Atlanta, GA 30315 (404) 624-5600 [w] (404) 292-6314 [h]

for the states of GA, AR and AL

VACANCY - for the states of LA and MS

Vikki Bohnert, 2264 Winkler Ave., B-11, Ft. Myers, FL 33901

for the state of Florida

John R. Turner, Denver Zoo, Denver, CO 80205

for the states of CO, NM, and TX

Steve Tigges, Tulsa Zoological Park, Tulsa, OK 74115

for the states of OK, NE, KS, ND, and SD

VACANCY - for the states of WA, OR, ID, MT, WY and AK

Art Goodrich, San Diego Zoo, San Diego, CA 92112

for the states of CA, NV, UT and AZ

Honolulu AAZK Chapter (Dan Vitiello, Pres.) (808) 923-4772 [w]

for the Hawaiian Islands

Terry Male, Metro Toronto Zoo, Box 280, West Hill, Ontario, Canada M1E 4R5

for the Province of Ontario, Canada

Bob Debets, Assiniboine Park Zoo, 2355 Corydon Ave., Winnipeg, Manitoba, Canada R3P 0R5

for the Province of Manitoba, Canada (204) 489-3893 [h]

Marcia Rasmussen, Calgary Zoo, P.O. Box 3036, Stn. B., Calgary, Alberta, Canada T2M 4R8

for the Provinces of Alberta and British Columbia, Canada (403) 235- 5461 [h]

AAZK would like to announce that Marcelle Guidry has resigned as RC for the States of LA and MS due to a career move to Texas. John Linehan has also resigned due to a career move as RC for the States of ME, VT, NH, MA, RI and CT. We thank Marcelle and John for their work on behalf of the Association and wish them well in their new positions. Vacancies now exist for RC positions for the following regions: (1) WA, OR, ID, MT, WY, and AK and (2) PA, DE, NJ, MD and the District of Columbia (3) LA and MS (4) ME, VT, NH, MA, RI, and CT. If you are interested in any of these positions, please contact one of the Regional Chapter Coordinator Co-Directors.

Until the vacancies are filled, those who have questions should contact the following individuals who are temporarily covering the states with vacancies: Tim Kurkowski, Zoo Atlanta, for the States of PA, DE, NJ, MD and District of Columbia as well as LA and MS; and Chris Garland, North Carolina Zoo, for the States of ME, VT, NH, MA, RI and CT.

Need membership information? Want to learn more about AAZK or start a Chapter or become more active - then call your RC! They will be glad to assist you with any information you need about AAZK.

AAZK Membership Application

Name _____ Check here if renewal []

Address _____

_____ \$25.00 Professional
Full-time Keepers

_____ \$20.00 Affiliate
Other staff & volunteers

_____ \$25.00 International
All members outside the
U.S. & Canada

_____ \$15.00 Associate
Those not connected
with an animal facility

_____ \$15.00 Library
Library subscription only

_____ \$50.00 Contributing
Organizations and
Individuals

Directory Information: Zoo: _____

Work Area: _____ **Special Interests:** _____

Mail this application and check or money order (U.S. CURRENCY ONLY PLEASE), payable to American Association of Zoo Keepers, Inc., to: AAZK National Headquarters, Topeka Zoo, 635 Gage Blvd., Topeka, KS 66606.

Membership includes a subscription to 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 for consideration.

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 no more than 6" x 10" (15cm x 25 1/2cm). Literature used should be cited in the text and in final bibliography. Avoid footnotes. Include scientific name of species the first time it is used. Thereafter use common name. Black and white photos only accepted.

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. Telephone 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 Ext. 31.

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

**Articles printed do not necessarily reflect the
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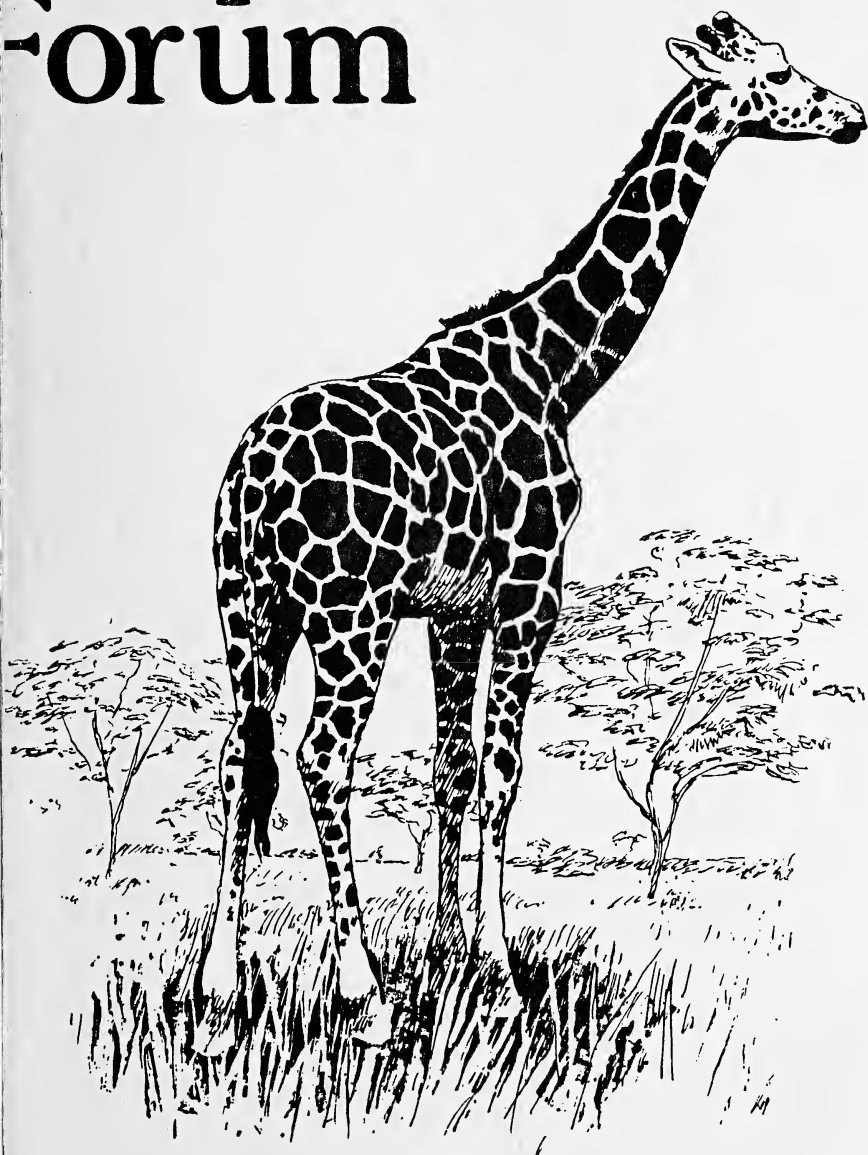


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Animal Keepers' Forum

October 1988



Dedicated to Professional Animal Care

ANIMAL KEEPERS' FORUM, 635 Gage Blvd., Topeka, KS 66606

Editor-in-Chief: Susan Chan
Assistant Editor: Alice Miser
Assistant Editor: Ron Ringer

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Judie Steenberg, Woodland Park Zoo

Keeper Training Materials Identification

Rosemary Jalink, Mill Mountain Zoo

An Approach to Zookeeping

Pat Sammarco, Lincoln Park Zoo

Handbook of Mother-Reared Infants

Vacancy

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Administrative Office Staff

Diet Notebook

Susan Bunn, Minnesota Zoo

Biological Values/Gestation

Greater S. F. Bay Area Chapter

Exhibit Design Form

Mark de Denus, Assiniboine Park Zoo

Legislative Advisor

John Stoddard, Brookfield Zoo

By-Laws Review

Marilyn Cole, Metro Toronto Zoo

Zoo/University List

Mike Illig, Washington Park Zoo

Nominations & Elections

Rachel Rogers, Miami Metrozoo

CO-DIRECTORS REGIONAL COORDINATORS

States East of the Mississippi - Diane Krug, White Oak Plantation, Yulee, FL

States West of Mississippi - Debbera Stecher, Woodland Park Zoo, Seattle, WA

Individual Regional Coordinators and the states they oversee are listed elsewhere in each issue of AKE.

*This month's cover art features a Reticulated Giraffe (*Giraffa camelopardalis*), a species native to Africa and commonly found in zoos throughout the world. The scientific name for the giraffe comes from a combination of an ancient African tale and Roman legend. The African version says that the giraffe was created by the Divine One from leftover parts of other animals--namely the camel and the leopard. The Roman legend calls the giraffe a "camel-leopard". The drawing was done by AAZK Associate member David Partington who is currently in his last year of studying for a degree in zoology at the University of Toronto, Ontario, Canada. Thanks, David!*

Scoops and Scuttlebutt

AAZK Diet Notebook Available NOW

The AAZK Diet Notebook, Mammals, Volume 1 is now available for sale through the AAZK Administrative Office. All copies taken to sell at the Tucson Conference were sold quickly and we anticipate mail order sales to be brisk. There is an order form in this month's issue of AAZK. Prepaid prices are: AAZK Members \$40.00; Non-members \$55.00; and Institutional \$70.00. Price includes a sturdy 3-inch D-ring binder, ISIS Order Dividers, and postage within the U.S. and Canada.

ADT Forms Available Upon Request

Animal Data Transfer Forms for zoos and aquariums are available free upon request. Contact Bernie Fledman, Burnet Park Zoo, 500 Burnet Park Drive, Syracuse, NY 13204. If your facility is not already using the ADT Form, encourage your administration to implement its use whenever an animal is shipped.

Ngare Sergoi Support Group to Sponsor Keeper Safari

The Ngare Sergoi Support Group is sponsoring a keeper tour of Kalahari, Botswana with canoeing and camping along the Zambizia River. This will be a tour designed for keepers with a primary objective of maximum animal concentration. It will be a unique trip for the hardy and the adventurous. The tour will depart on 15 October 1989 for a 15-day trip. Cost of the trip is \$2990 (from New York) and the price includes air and ground transportation, hotel and food. A brochure detailing the itinerary should be available later this month. For more information, please write: Andy Lodge, Ngare Sergoi Support Group, P.O. Box 29503, Columbus, OH 43229 or call (614) 766-3413 or (614) 431-0486.

Andy, coordinator of the organization which helps support conservation efforts at Anna Merz's Ngare Sergoi Rhino Sanctuary in Kenya, sends his sincere thanks to all delegates at the 14th National AAZK Conference for their encouragement and support via donations, purchasing of Sanctuary T-shirts, and special rhino items in the Live Auction. All funds generated by the support group go to maintaining the Ngare Sergoi Rhino Sanctuary.

Zoo Stories Book Available from Brookfield Chapter

The book "What Kind of Animal Are You?", a collection of zoo keepers' favorite anecdotes about their work, the animals, and the visitors, is available from the Brookfield Zoo AAZK Chapter. After initial production costs are met, profits on the book will be split 50/50 with AAZK Administrative Offices. The purchase price of the book is \$4.20 which includes postage and handling. It may be ordered by sending a check or money order (U.S. Funds only) made out to "Brookfield AAZK Chapter to: Zoo Stories Book, Brookfield AAZK Chapter, 3300 Golf Road, Brookfield, IL 60513.



From the President.....

The 14th annual National AAZK Conference was an overwhelming success with an increase of almost twenty percent from the previous year's conference. This continuing trend represents your motivation towards continuing education and striving for greater professionalism in zookeeping and conservation.

I would like to thank the Tucson AAZK Chapter for an outstanding effort and hope that they continue their Chapter activities. Their cohesiveness as a group and dedication towards our cause was easily evident to all who attended the conference.

Business at this year's meeting proceeded faster than usual due to a number of reasons. The mid-year Board of Directors' meeting in Topeka allowed us greater continuity in the ideas we discussed. In addition, the membership was made aware of major activities such as the By-laws revisions prior to the conference and committee reports were made available to all delegates.

We have also redesignated our National headquarters in Topeka as AAZK Administrative Offices. This change reflects our desire to function together as a national and local organization.

I hope that first time and veteran conference attendees will contact the Board to fill a number of committee vacancies. Openings remain for Safety Committee, two Regional Coordinator positions, AAZK Liaison to AAZPA/IZE, Handbook for Mother-reared Infants and several Chapter projects. San Diego is looking for a chapter to take on the AAZK belt-buckles and a safety magnet idea has been suggested as a worthwhile and needed item.

Several persons took the opportunity of the conference to take on some vacancies. Tim Kelly from the Assiniboine Park Zoo in Winnipeg will succeed Phil Pennock as chair of the Conference Book Committee. This book will serve to guide chapters bidding for or hosting a national or regional conference. Cynthia Simpson of Brookfield Zoo in Chicago has volunteered to take over the Staff Exchange Project from Elandra Aum. On behalf of the Board of Directors, I want to thank Phil and Elandra for their time and efforts in these AAZK committees.

Other new appointments include: Awards Committee - Jan McCoy, Washington Park Zoo; Nominations & Elections Committee - Rachel Rogers, Miami Metrozoo; Exhibit Design Form - Mark de Denus, Assiniboine Park Zoo; Keeper Training Videotapes - Marilyn Cole, Metro Toronto Zoo (effective 1 January 1989).

The By-laws revisions were unanimously passed by the membership attending the General Business Meeting on the final day of the conference. These revisions will now be utilized by our lawyer in applying for non-profit IRS tax status for the Association. The membership is to be commended for their valuable input in reviewing these revisions at the meeting.

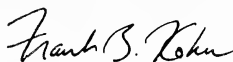
The Audubon Park Zoo AAZK Chapter in New Orleans was successful in their bid to host the 1990 AAZK Conference. Chapters should consider now bidding for the 1991 conference site. In addition we are looking for a site for our 25th anniversary conference in 1992.

I would like to thank several individuals and groups for outstanding work on behalf of the organization and its goals. Susan Bunn has contributed invaluable time and effort along with Susan Chan in the completion of the AAZK Diet Notebook. Thirty copies were sold in twenty minutes on the first day of the conference. The Assiniboine Park Zookeepers Association significantly aided the funding of this completed project. Ed Hansen personally handled any and all problems encountered by the Board during our two days of meetings which allowed for the smooth flow of business. He also threw me a few well needed curves and I thank him for that.

From the President, Continued

Finally, Mark de Denus has delivered *Zooquest*, a game designed in the vein of Trivial Pursuit®, but with an emphasis on conservation and education. I urge all members to try out the game and alert zoo gift shops and local game stores of its existence. Such efforts can only increase the number of people who will learn about conservation and its urgency.

Please take this post-conference time to contact newly found colleagues and seek out further methods to increase knowledge and educate the public about our goals. I look forward to seeing you all in Syracuse next year.



Frank B. Kohn
AAZK President



AAZK Announces New Professional Members

Laurie Bebeck, New England Science Center (MA)	Joan Kamerman, Bronx Zoo (NY)
Rhonda Withington, Virginia Zoo (VA)	Celia Lewis, North Carolina Zoo (NC)
C. Douglas Page, DVM, Jacksonville Zoo (FL)	Sharon Adams, Knoxville Zoo (TN)
Kristina Brickbaum, Jackson Zoo. Prk. (MS)	Sheree Shirley, Jackson Zool. Prk. (MS)
Eduardo R. Perdon, Binder Prk. Zoo (MI)	Dales S. Leeds, Toledo Zoo (OH)
Kayla Grams, Binder Prk. Zoo (MI)	Bruce Wojcik, John Ball Zoo (MI)
Debbie Strzelecki, Milwaukee County Zoo (WI)	William Moran, Lincoln Prk. Zoo (IL)
Richard C. Smith, St. Louis Zoo (MO)	Lonnie McCaskill, Dallas Zoo (TX)
Genevieve Lee, Denver Zoo (CO)	Chuck Waters, Reid Park Zoo (AZ)
Elizabeth Conklin, Sea World, Inc. (CA)	Mark Cirillo, San Diego Zoo (CA)
Kim Weibel, San Diego Zoo (CA)	Amy Lynn Kendall, San Diego Zoo (CA)
Lauren DuBois, Sea World, Inc. (CA)	Linda Boudreau, Granby Zoo (Quebec)
Debbie Hayman, Bowmanville Zoo (Ontario)	Rusty Copeland, Edmonton Valley Zoo (Alberta)
Edward Ryan, Stanley Prk Zoo (Vancouver)	

Information Please

I am currently researching and compiling a register on all institutions holding *Ateles fusciceps robustus* or *Ateles fusciceps fusciceps*. Common names may be Black Spider Monkey or Brown-headed Spider Monkey. If your facility has had or currently owns or exhibits either of these species, or if you know of any institutions that do, could you please send details to: National Zoological Park, Connecticut Ave., Washington, D.C., 20008 c/o Rob Schumaker, Dept. of Mammals.

I am seeking information on dietary-related upper respiratory problems in tortoises. Please send any information to: Leland Eiben, P.O. Box 3068, Galveston, TX 77552.



Coming Events

The 5th World Conference on Breeding Endangered Species in Captivity

October 9-12, 1988

Cincinnati, OH

For further information contact: *Betsy Dresser, Director of Research, Cincinnati Zoo, 3400 Vine St., Cincinnati, OH 45220 (513) 281-4701.*

The First International Symposium on Spectacled Bears

October 14-15, 1988

Chicago, IL

To be held at the Lincoln Park Zoo. Topics focusing on current field studies and captive management/reproduction of the spectacled bear will be highlighted. These include: captive management, demographics, reproduction in captivity, nutrition, vocalization and mother/infant behavior. For further information contact: *Mark Rosenthal, Curator of Mammals, Lincoln Park Zoo, 2200 N. Cannon Drive, Chicago, IL 60614, (312) 294-4660.*

IMATA 16th Annual Conference

Oct. 30-Nov.4, 1988

San Antonio, TX

Meeting of the International Marine Animal Trainers Association. Conference will include paper sessions, post presentations, trophy competition, Photo/Art contest and a day trip to Sea World. For further details contact: *Ken Ramirez, IMATA Vice-Pres., Entertainment Plus, 6608 Stewart Road, Suite 169, Galveston, TX 77551 (409) 744-0938.*

Association of Zoo Veterinary Technicians Eighth Annual Conference

Nov. 4-6, 1988

Toronto, Canada

To be held at the Hotel Sheraton Centre. Topics will include: handrearing the infant orangutan; reproductive research in embryo transfer; and reptile medicine, including anaesthesia of venomous snakes. Registration fee of \$100 includes attendance to all presentations, luncheons, and banquet dinner. A copy of conference proceedings, as well as local transportation are also provided. For information, contact: *AZVT Vice-President, Virginia Crossett, Louisville Zoo, P.O. Box 32750, Louisville, KY 40233 or call (502) 459-2181.*

Ninth Annual Elephant Workshop

Dec. 7-10, 1988

Jacksonville, FL

Hosted by the Jacksonville Zoological Park. For further information contact: *John R. Meyer, P.O. Box 26727, Jacksonville, FL 32218 or call (904) 757-4463.*

Coming Events, *Continued*

NOTICE: The Scholl Conference on the Nutrition of Captive Wild Animals will not be held in 1988. The next Nutrition Conference will be held in late 1989 at the Lincoln Park Zoo. Any persons interested in submitting papers for the 1989 conference should contact: *Dr. Thomas P. Meehan, Lincoln Park Zoo, 2200 N. Cannon Dr., Chicago, IL 60614 (312) 294-4689.*

Restoration: The New Management Challenge

Jan. 16-20, 1989

Oakland, CA

First annual conference of the Society for Ecological Restoration & Management Program will include papers, poster sessions and special lectures and workshops on the topics of restoration of national parks and on setting standards for the evaluation of restored ecological communities. Abstracts of papers must be received by **15 Nov. 1988** to be considered. For further information and registration forms write or call: *S.E.R.M. Annual Meeting, 1207 Seminole Highway, Madison, WI 53711 (608) 263-7889.*

AAZPA REGIONAL CONFERENCES

AAZPA Great Lakes Regional: March 5-7, 1989. For more information contact: Mike Blakley, Curator/Mammals, Kansas City Zoo, 6700 Zoo Drive, Kansas City, MO 64132 (816) 333-7406.

AAZPA Western Regional: March 19-21, 1989. For more information contact: Murray Newman, Ph.D., Director, Vancouver Public Aquarium, P.O. Box 3232, Vancouver, B.C., Canada V6B 3X8 (604) 68503364.

AAZPA Southern Regional: April 2-4, 1989. For more information contact: Terry Maple, Ph.D., Director, Zoo Atlanta, 800 Cherokee Ave. SE, Atlanta, GA 30315 (404) 624-5600.

AAZPA Central Regional: April 16-18, 1989. For more information contact: Hayes Caldwell, Director, Caldwell Zoo, P.O. Box 428, Tyler, TX 75710 (214) 593-0121.

AAZPA Northeast Regional: April 30-May 2, 1989. For more information contact: Minot Ortolani, Director, Buffalo Zoo, Delaware Park, Buffalo, NY 14214 (716) 837-3900.

Fertility in the Great Apes

June 15-17, 1989

Atlanta, GA

For preregistration and information contact: *Dr. Kenneth G. Gould, Yerkes Regional Primate Research Center, Emory University, Atlanta, GA 30322 (404) 727-7720.*



Births & Hatchings



Columbus Zoo...some rare reptile hatchings, black-footed penguin chicks, and a Chinese lesser panda birth highlight the Columbus Zoo's reproductive efforts for April-July 1988. The Reptile Dept. had some notable achievements these four months. Nine hatchings of Red-chinned spitting cobras (*Naja n. nigricollis*) may represent the first successful breeding of this type of spitting cobra in North America. Hatchings of Geoffroy's side-necked turtle (*Phrynops geoffroanus*) represent the sixth second-generation turtle in our collection (the adults were captive-bred at the San Antonio Zoo) and those of Giant musk turtles (*Staurotypus triporcatus*) are the seventh second-generation turtle species at Columbus. The following is all reptile hatchings from April to 27 July, 1988. Turtles and tortoises: 57 *Staurotypus salvinii*, 32 *Staurotypus triporcatus*, 11 *Graptemys versa*, 11 *Elseya novaguineae*, 16 *Kinosternon s. cruentatum*, 1 *Terrepene c. major*, 4 *Melanochelys t. thermalis*, 5 *Callagur borneoensis*, 12 *Phrynops geoffranus*, 3 *Graptemys nigrinoda*, 20 *Pelusios castaneus*, 1 *Malacocherus tornieri*, and 1 *Phrynops gibbus*. Snakes: 1 *Aghistrodon b. taylori*, 6 *Hydrodynastes gigas*, 9 *Trimeresurus kanburensis*, 12 *Crotalus vegrandis*, 19 *Elephe t. freesi*, 7 *Leiohetersodon madagascariensis*, 5 *Naja haja*, 2 *Naja haja x annulifera*, 9 *Naja n. nigricollis*, and 7 *Boiga dendrophila*. Lizards: 5 *Hemitheconyx caudicinctus* and 1 *Ptychoactylus hasselquisti*.

In June our Bird Dept. hatched 0.02 Black-footed penguin (*Spheniscus demersus*) from two different pairs, both of which have produced offspring before. The chicks took their first swim at eleven weeks of age. We have hatched seven black-footed penguin chicks prior to these two. Other bird hatchings include 0.04 Common rheas (*Rhea americana*), 0.03 Mandarin ducks (*Aix galericulata*), 0.03 Wood ducks (*Aix sponsa*), and 0.05 Black-necked swans (*Cygnus melanocoryphus*).

Highlights in the Mammal Dept. were births of Chinese lesser pandas, tigers, cheetahs, pronghorn, and a gorilla. We have had breeding success again this year in our pronghorn (*Antilocapra americana*) group. All three females produced fawns: 1.1 on 22 May (DNS), 1.0 on 10 June, and 1.1 on 13 June. The three surviving fawns have been successfully hand-raised. Due to their low tolerance to high humidity levels and to their extremely nervous nature, pronghorn have traditionally been very difficult to maintain east of the Mississippi River. We acquired our adult group of 1.4 as hand-raised infants from the Minnesota Zoo several years ago. On 29 May, a 1.0 Chinese lesser panda (*Ailurus fulgens styani*) was born. This is the second breeding for our pair, who are approximately five and a half years old and have been at Columbus about three years. We are one of a handful of U.S. institutions to have the Chinese race of lesser pandas.

On 9 June, we had the first of two litters of Bengal tigers (*Panthera tigris*), 4.0 born to eight-year-old Dolly and sired by 13-year-old Ika. Ika is white and Dolly is yellow phase with recessive white genes, but all four cubs have coats ranging from yellow to orange. This is Dolly's fourth litter, the last three having been sired by Ika. On 25 June, 1.1 white cubs were born to three-year-old Taj, also white, and Ika. Taj herself was born in Columbus, having been in Dolly's first litter. This was Taj's first litter, and she seemed somewhat agitated, pacing alot and growling at the cubs. Therefore, they were pulled the day after birth to be hand-raised. On 17 June, 1.3 (1.2 DNS) Cheetah (*Acinonyx jubatus*) cubs were born to Sukari, sired by Charlie. This is especially noteworthy because Charlie is one of two breeding males at Columbus. The pair bred in one of the smaller off-exhibit areas with juvenile cubs observing from adjacent pens on both sides. On 23 June, a 1.0 Lowland

Births and Hatchings. *Continued*

gorilla (*Gorilla g. gorilla*) was born to Toni, owned by Columbus, and Sunshine, a male on loan from San Francisco. This infant did not survive. *submitted by Carl Gyarmaty, Columbus AAZK Chapter Secretary, Columbus Zoo, Columbus, OH.*

Bronx Zoo...the Bronx Zoo AAZK Chapter announces the following significant births and hatchings for the month of July. The Dept. of Mammalogy is proud to announce the births of 0.0.2 Rodriguez fruit bats, also known as Rodriguez flying foxes (*Pteropus rodricensis*).

As recently as 30 years ago, thousands of these bats which are endemic to the Rodrigues Island in the Indian Ocean, could be found. Now, due to deforestation only about 200 are left on the island. Fortunately a breeding colony has been established by the Jersey Wildlife Preservation Trust. The Bronx Zoo hopes to have success in their breeding program as well and in doing so help in assuring the survival of this species. Two female Formosan sika deer (*Cervus nippon taiwanus*) were born this month adding to the herd of this endangered species. The Bronx Zoo maintains a major breeding program for this species. On 19 July a female Pudu (*Pudu pudu*) was born. These tiny deer are native to the deep forests of Chile and Argentina. On 13 July a male Nyala (*Tragelaphus angasi*) was born. Nyalas are in the group of spiral-horned antelopes which are only found in Africa. Usually only the males have the distinctive corkscrew-like horns. They can exist on quite poor quality of forage and are not territorial; this gives them a good chance of survival. The spiral-horned antelopes have a honored place in African traditions. Rock paintings on the Kalahari include sketches of the common eland as domesticated by the Bushmen.

The Dept. of Ornithology hatched two more, as yet unsexed, American flamingos (*Phoenicopterus ruber ruber*). These beautiful and popular exhibit birds are breeding well at the Bronx Zoo after a few years when they were disturbed by construction nearby. On 18 July 0.0.1 Malayan peacock pheasant (*Polyplectron malacense malacense*) were hatched.

The Dept. of Herpetology had an Independence Day hatchings of 0.0.6 Broad-snouted caiman (*Caiman latirostris*), and on 10 July 0.0.14 Dumeril's ground boas (*Acretophis dumerili*) were born. *submitted by Wendy Worth, Corresponding Secretary, Bronx Zoo AAZK Chapter, Bronx, NY.*

San Diego Wild Animal Park...the latest success in the SDWAP's efforts to breed endangered species came on 11 September with the birth of a rare black rhinoceros. The newborn male, named Jioni by keepers, is only the third of his species to be born at the park. His name means "evening" in Swahili. Jioni is the offspring of Cornelius, a eight-year-old male owned by the Zoological Society of San Diego, and Judy, whose age is unknown, having been wild-caught in 1973. She arrived at SDWAP in November of 1986 on a breeding loan from the Brookfield Zoo. Jioni was born after a gestation of 489 days. There are currently 68 black rhinos in the U.S.; 80 rhinos have been born in the U.S. since 1941. The black rhino has suffered a dramatic decline in its native Africa in recent years. From an estimated 60,000 in 1970, the population has dropped to fewer than 4,000 today. *from San Diego Wild Animal Park News Release, Escondido, CA.*

Zoo Atlanta...births and hatchings for 1 March through 15 July include 1.1 California sea lion, 2.3 Black-necked swan, and 1.2 Grey hornbill. Acquisitions include 0.0.6 Sweet waxbill, 0.0.16 Orange-cheeked waxbill, 0.0.16 St. Helena's waxbill, 1.1 Hartlaub's duck, 0.0.4 White-crowned robin chat, 0.0.5 Green fruit pigeon, 1.1 Hadada ibis, 1.1 Jardine parrot, 2.2 Dumeril ground boa, 3.0 Red ruffed lemur, and finally 4.9 Lowland gorilla and 1.4 Sumatran orangutan. The great apes are on permanent breeding loan from the Yerkes Primate Center.

It's been a busy summer for Zoo Atlanta. On 11 June our new African Rainforest exhibit opened with a 2000 square foot West African aviary and an outdoor three-acre gorilla exhibit (consisting of four separate yards) with an off-exhibit indoor holding area of 7700

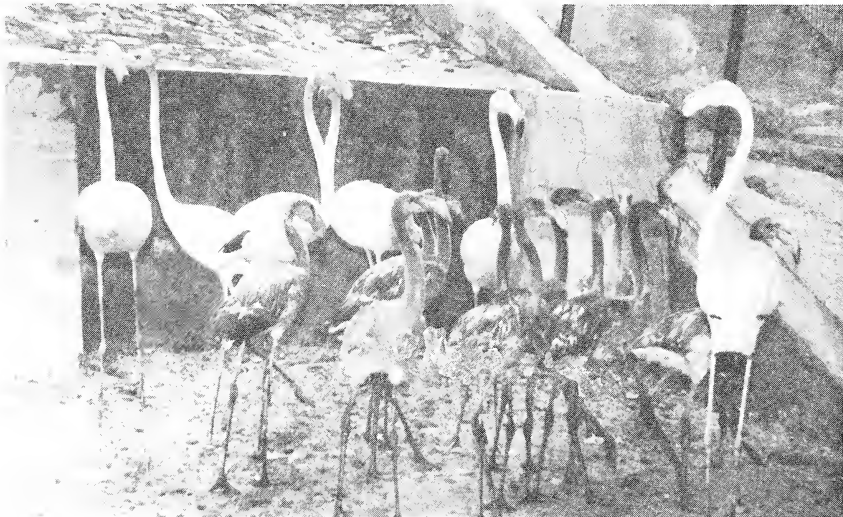
Births and Hatchings, *Continued*

square feet. On 10 July our Indonesian Rainforest opened consisting of three spacious outdoor yards for Sumatran orangutans. The African Savanna and Mzima Springs exhibits are currently under construction and scheduled to open in late 1989. *submitted by Tim Kurkowski, Co-Vice President, Zoo Atlanta AAZK Chapter, Atlanta, GA.*

Mesker Park Zoo...B&H for our zoo from 1 January through 14 August 1988 include: Mammals - 0.0.14 African hedgehog (4 DNS), 4.1 African pygmy goat, 2.1 Sicilian donkey, 1.0 Grant's zebra, 2.1 Sitatunga, 1.2 Barasingha (1 DNS), 1.0 Pygmy zebu, 0.1 Onager, 1.1 Chinese waterdeer, 0.1 Reticulated giraffe, 2.0 Nilgai, 0.1 Mandrill and 0.0.2 Canada lynx (DNS); Birds - 0.0.2 Sarus crane, 0.0.2 Superb starling, 0.0.5 Wild turkey, 0.0.14 Mute swan (2 DNS), 0.0.1 Patagonian duck; Herptiles - 0.0.42 Indian rock python. *submitted by Ginjr. Buente, Chapter Liaison, Mesker Park Zoo AAZK Chapter, Evansville, IN.*

Ahmedabad Zoo, India...It is a matter of great pride for Ahmedabad Zoo that 20 pairs out of 25 of Greater flamingoes (*Phoenicopterus ruber ruber*) have successfully bred and are now rearing 13 young (see photo). This has been the result of the sustained enthusiasm and efforts of Mr. Reuben David and his colleagues at Ahmedabad Zoo. The achievement is more important when we see that flamingoes have deserted all breeding sites in India, including Flamingo City in the Rann of Kutch due to natural and human disturbances. Flamingo City was, in fact, the original and well-established breeding site for years until some years back a catastrophic cyclone destroyed many flamingoes and their young. Since then they have not returned to this nesting site.

For a number of years since 1971 the Ahmedabad Zoo has been regularly breeding flamingoes in captivity. It was the first zoo in India to achieve this success. The flamingo colony in Ahmedabad Zoo is very well established. Special arrangements have been made to protect the young, especially from rats which sometimes steal the young. A special diet has been provided to keep up their stamina and color. *submitted by Mr. Babubhai, Senior Keeper, Kamla Nehru Zoological Garden, Ahmedabad, India. Mr. Babubhai is one of a number of foreign keepers sponsored by AAZK Chapters. He is sponsored by the Zoo Atlanta AAZK Chapter.*



The Kamla Nehru Zoological Garden, Ahmedabad, India holds the Asian record for breeding and rearing Greater Flamingoes in captivity. Pictured above are some of this year's offspring with adult members of the flock. *(Photo by Kumar Shah)*

Births and Hatchings, *Continued*

Busch Gardens/Tampa...included among the B&H for August 1988 were: 4.5 Thomson's gazelle, 2.1 Grant's gazelle, 3.0 Greater kudu, 1.0 Sitatunga, 2.1 Scimitar-horned oryx, 0.0.1 Douroucoulli, 1.2 Nyala, 1.2 Addra gazelle, 2.0 Reticulated giraffe, 1.0 Grant's zebra, 1.1 Muntjac, 1.0 Topi; 0.0.1 Collared lizard, 0.0.1 Ball python; 0.0.6 Hahn's macaw, 0.0.1 Sun conure, 0.0.5 Jandaya conure, 0.0.4 Dusky lory, 0.0.7 Blue and gold macaw, 0.0.1 Indian peafowl, Blue Phase, 0.0.1 White-bellied caique, 0.0.2 American flamingo, 0.0.9 Red-billed tree duck, 0.0.2 East African crowned crane, 0.0.1 Mexican military macaw, and 0.0.2 Black-capped lory. *submitted by Mary Eisenacher, Animal Records, Busch Gardens, Tampa, FL.*

Los Angeles Zoo...significant occurrences at the L.A. Zoo for the month of August 1988 include: Mammals - 0.0.1 Tufted capuchin, 2.1 Cottontop tamarin, 0.0.5 Warthog (our fifth litter; all are being mother-reared at this time), 1.0 Gerenuk and 0.0.1 Guar (aborted); Birds - 0.0.3 Ostrich, 0.0.1 Ocellated turkey, 0.0.2 Snow geese, 0.0.1 Harris hawk, 0.0.2 King vulture, and 0.0.1 Glossy ibis (DNS). *submitted by Kim Brinkley,, Chapter Liaison, Los Angeles Zoo AAZK Chapter, Los Angeles, CA.*



Have any good photos? The AAZK Public Education Committee is looking for photo contributions to be used in the "Zookeeping As A Career" poster project. Photo submitted should show keepers working in the areas of Animal Care, Research, Conservation and Education. We need color photographs in 5" x 7" or 8" x 10" size, or send a negative with your regular size photo. Send photos to: Tom LaBarge, c/o Burnet Park Zoo, 500 Burnet Park Drive, Syracuse, NY 13204.

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An Under-Exploited, Super-Abundant Prey

By

Martin Hancox
Animal Ecology Research Group
South Parks Rd., Oxford, England

The study of many aspects of social and foraging behavior for a considerable range of species can benefit greatly by using semi-captive animals in conjunction with the direct observation of individuals in the wild. Some species may feed on easily digested invertebrate prey such as slugs and worms, and the importance of such foods is greatly underrated.

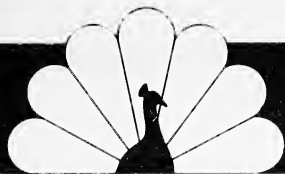
Earthworms obtain a biomass of between 1000-4000 kg per ha in pasture in one European study (1); a respectable figure even in comparison with potential vertebrate prey species. Some exploiters of this super-abundant, temperate regional food resource have long been familiar, ranging from Kiwis to gulls, and waders such as the American woodcock, notably also the crow and thrush families, as well as various amphibians and insectivores (2). Larger mammalian predators may also rely heavily on worms; in Europe they comprise over 50% of the annual diet in most studies of the badger, and are a major food of red foxes in many lowland habitats (1,3,4). These studies variously show that one large, very common species, *Lumbricus terrestris*, which both feeds and mates on the ground surface nocturnally, forms the bulk of this prey; often 150-200 worms or c. 1000 ml per badger meal. Worm "availability" is greatest on mild, damp, windless microclimatic patches, and during the spring and autumn activity peaks, while pasture and mixed deciduous woodland have a greater biomass than frequently ploughed arable land, moorland or coniferous plantations (3,5).

Worms are utilized by stoats feeding young (6), and are seasonally important to opossums and raccoons (7), but seem otherwise not to have been recorded as of equivalent importance to a major mammalian predator in North America. Several early badger and fox studies failed to detect worms in the diet, since only microscopic chaetae or gizzard rings occur in scat material, and digestion is rapid even if stomach material is available (8,9). Also, worms may be a valuable prey seasonally, but have a low wet weight calorific yield (0.7 K. cal. per gm). Fat reserves important for overwintering and subsequent breeding in both the American (10) and European badger are, in the latter more omnivorous species, largely accumulated via a plant diet; nuts such as acorns, and grain having some 5-10 times the wet weight calorific yield of earthworms. Raccoons similarly take acorns in the fall, and various species of bear gorge on fruits and berries before hibernating.

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Detecting Estrus in the Black Rhinoceros at the Columbus Zoo

By

William R. Pittenger
Pachyderm Keeper
Columbus Zoo, Columbus, OH

The Columbus Zoo currently houses a pair of black rhinoceros (*Diceros bicornis*). The male, Clyde, is 36 years old and the female, Kenya, is 13 years old. The zoo has tried to breed the rhinos both naturally and artificially. When natural breeding was attempted, the male became aggressive and knocked the female on her side. The zoo decided the only way to use the male for breeding is by artificial insemination.

The Columbus Zoo has made three attempts to artificially inseminate two female black rhinos. However, fertilization was never achieved. The main problem encountered is determining estrus in the female. Estrus is the period in the female's estrous cycle when she is receptive to the male. To successfully inseminate the female, the semen must be deposited into the female's uterus during estrus.

The Columbus Zoo is currently trying four methods to determine estrus in the female black rhino.

The first method is reading the vaginal cytology of the female. The female is directed into position. Next, the keeper enters the pen and rubs her rump. The tail is held to her side and the vulva opened. This eliminates debris from cluttering the smear. The keeper inserts a Q-tip swab into the vagina. The swab is taken out and rolled across a microscope slide. We take two smears once a day. One smear is stained and read by a veterinarian at the Ohio State University. The second smear is stained with methylene blue and read by me. The smears are examined for cell types and numbers. The cell types and numbers varied greatly from day to day. Thus, no estrus cycle could be charted by reading vaginal smears.

The second method, vaginal temperature, is recorded daily. A thermometer is inserted into the vagina for approximately three minutes. Figure 1 shows the daily vaginal temperature of the female black rhino. The line graph shows how the vaginal temperature fluctuated daily. No correlations between vaginal temperature and estrus was discovered. However, Dr. David Zartman of The Ohio State University, Department of Dairy Science, has invented an implant that monitors vaginal temperature. This implant can measure the temperature better than a regular thermometer and has shown a correlation between increases in temperature and estrus in cattle. We inspected our female rhino to see if an implant would work. We discovered our female has a partially blocked vagina and the implant could not be inserted.

The third method, vaginal discharge, is examined and recorded daily. The keeper, when taking the vaginal smear, will examine and feel the vaginal area of the female. When the female is in estrus, the vaginal discharge and vagina will be wet. After estrus, the discharge is sticky and becomes crusty. Figure 2 shows the relationship between the consistency of the vaginal mucous and the period of estrus. On some days, we had a problem with the female getting muddy, and thus concealing any vaginal discharge. We designed a system of 1 to 5 to label the discharge. 1 = dry, no discharge, 2 = sticky, little discharge, 3 = moist, little discharge, 4 = wet, discharge clear and noticeable, and 5 = crusty, little discharge. We kept records of the vaginal discharge from 8 December, 1985 to 25 January 1986. Unfortunately, we had no way to test our results. During the month of January, we had trouble finding time and manpower, so this method was discontinued.

Figure 1: Daily Vaginal Temperature

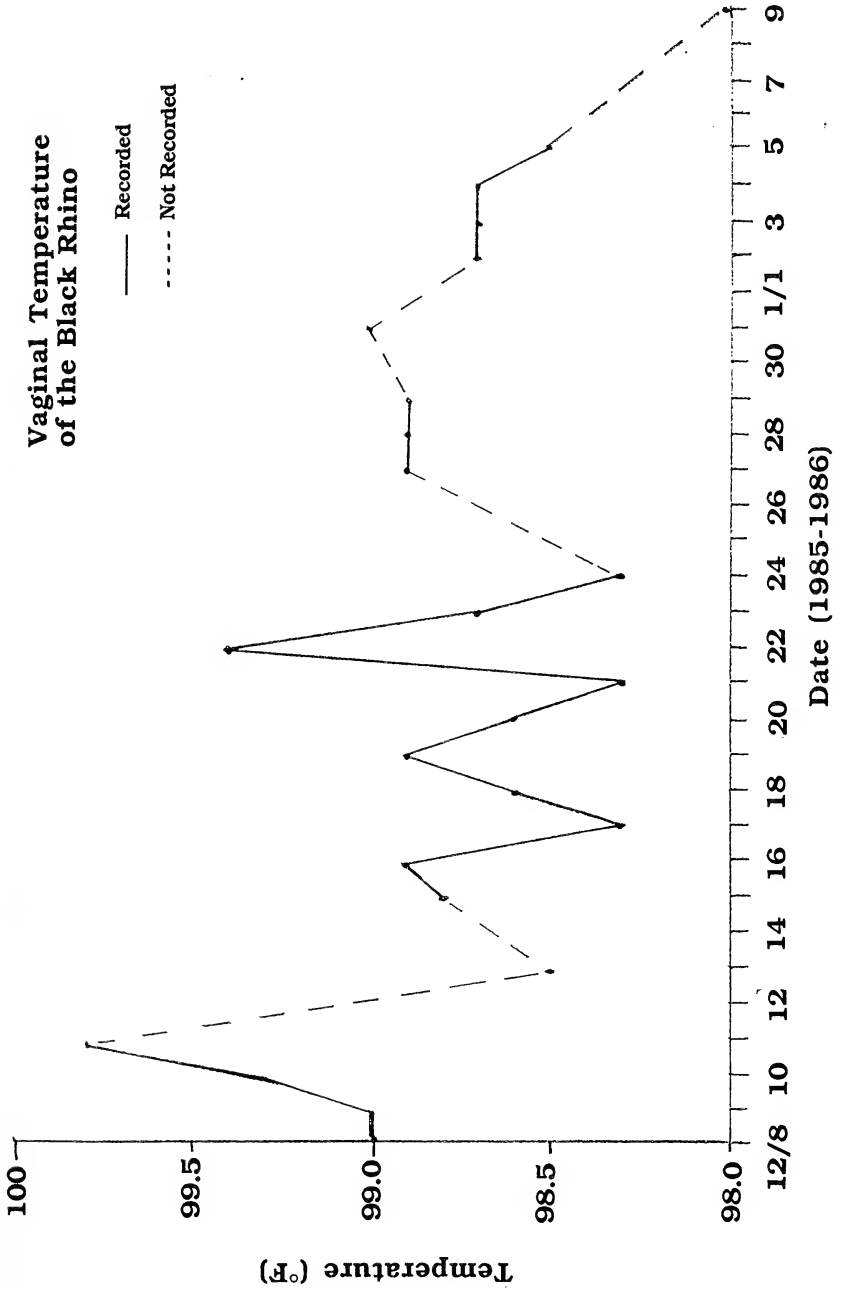


Figure 2: Vaginal Discharge

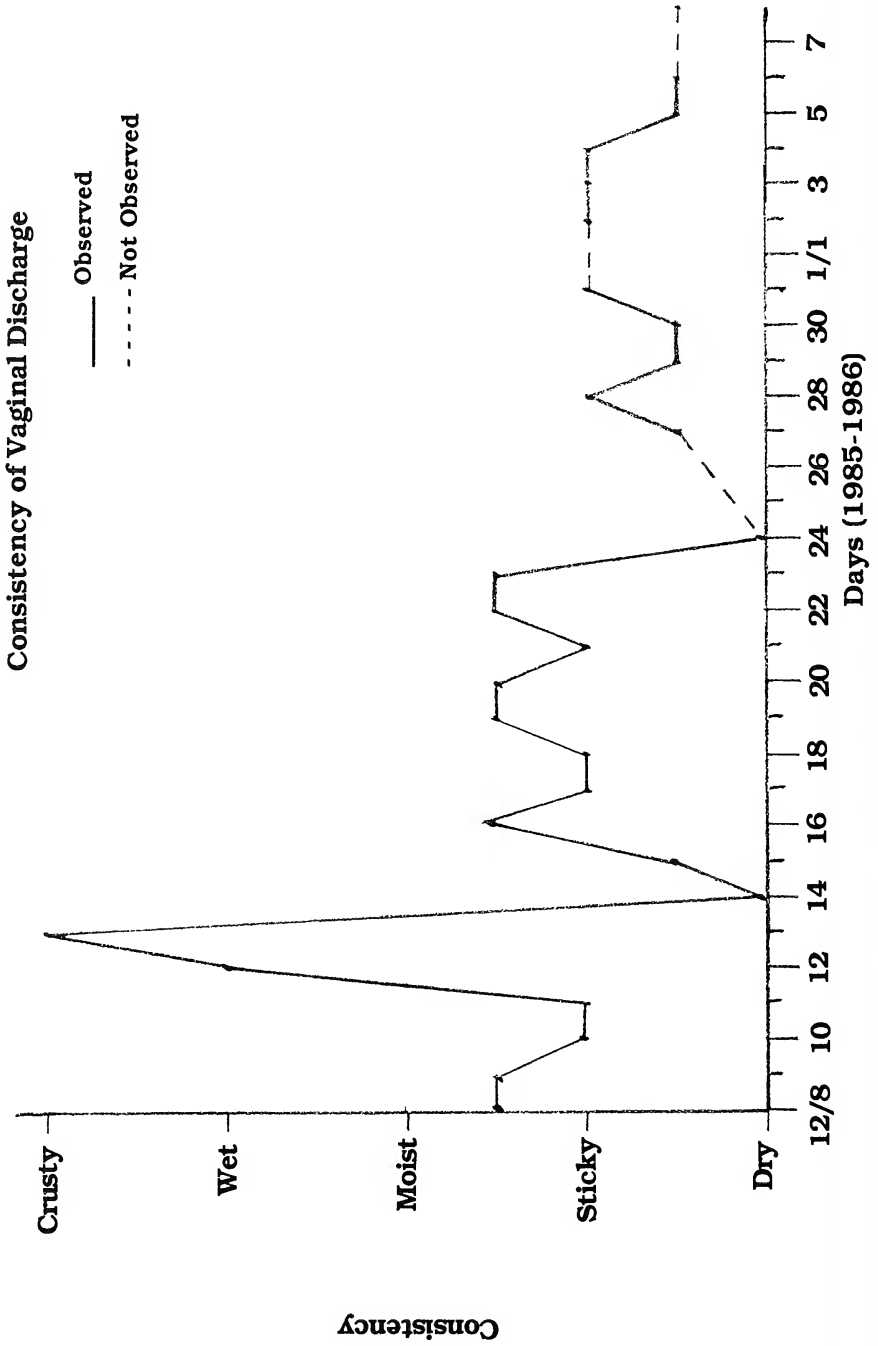


Figure 2 (cont'd): Vaginal Discharge

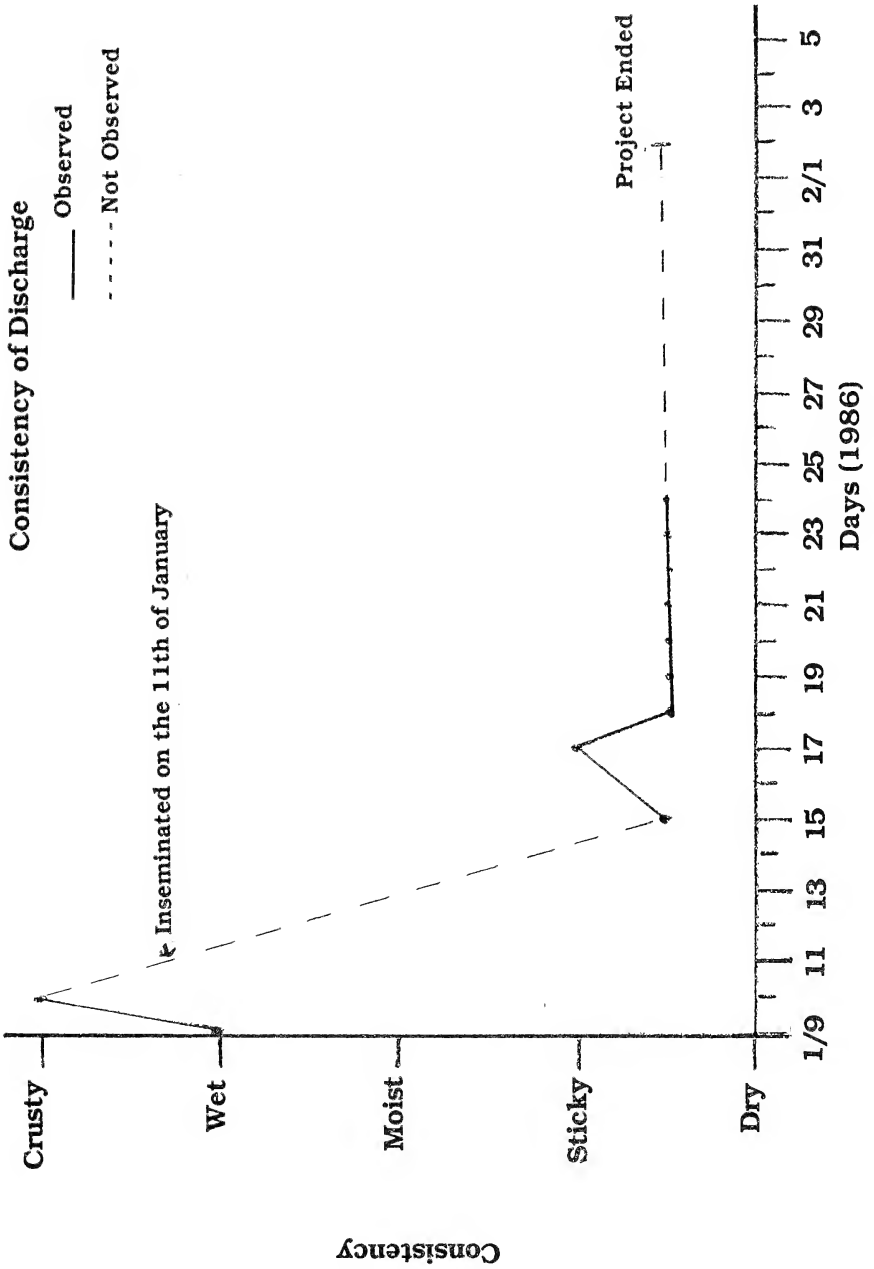


Figure 3: Effects of Estrus on Activity

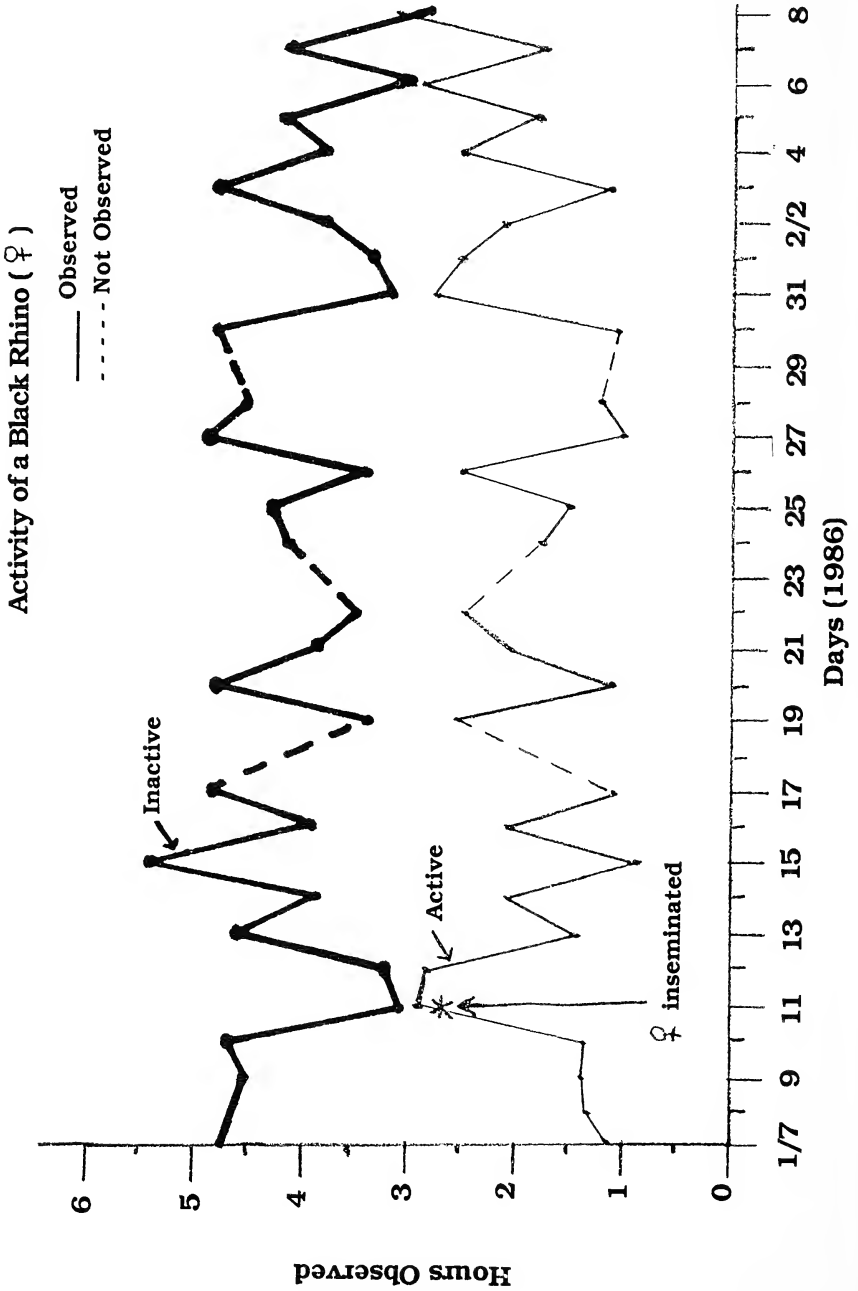


Figure 3 (cont'd): Effects of Estrus on Activity

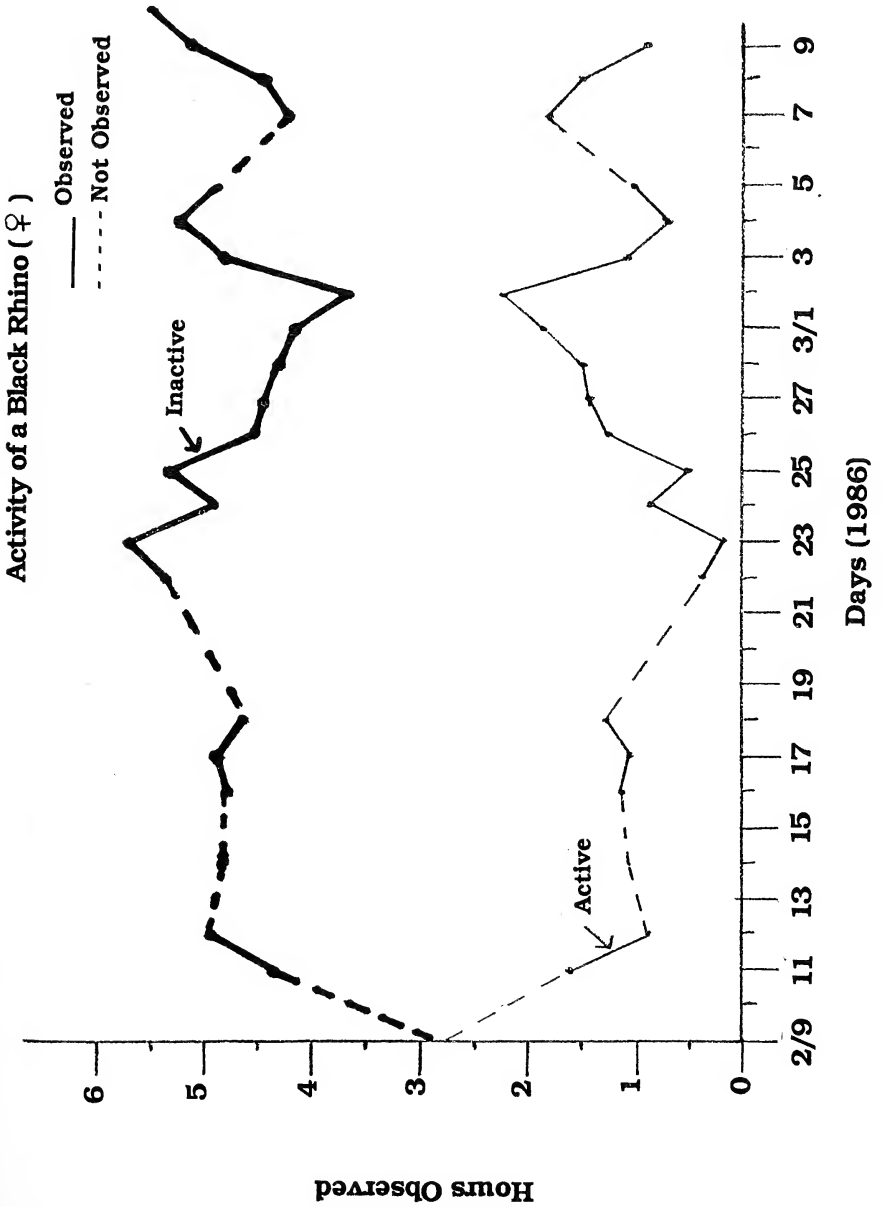
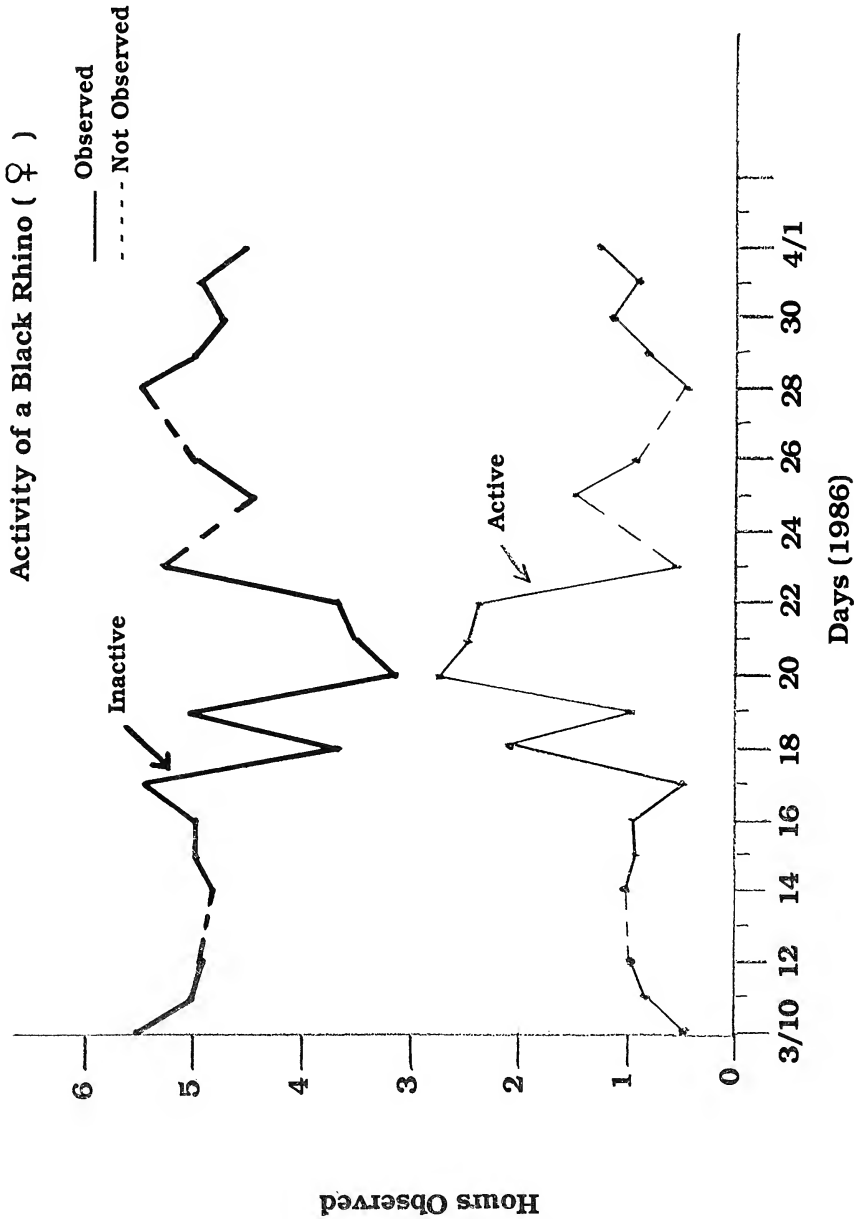


Figure 3 (cont'd): Effects of Estrus on Activity



Detecting Estrus in the Black Rhinoceros at the Columbus Zoo. *Cont'd*

The fourth method, estrous behavior, is recorded daily for six hours. Females, when in estrus, will display various special behaviors (Hafez, pp. 307, 1980). In sheep, cattle, horses, swine, and goats, there have been noted increases in motor activity during estrus (Hafez, 307, 1980). We decided to monitor the motor activity of our female. We could only record for six hours, so we decided to film the female from 11:00 p.m. to 5:00 a.m. This time period was selected due to the female being less active and no public on the zoo grounds. We felt an increase in activity would be easier to detect during this time period.

The tapes were analyzed for the amount of time active and inactive. The time active consisted of eating, walking, and horn rubbing. The time inactive consisted of the female either lying down upright with her legs underneath her or lying down on her side. The female would only lie on her side when she was completely relaxed.

Figure 3 shows the relationship of time active and time inactive with estrous behavior. On 11 January, 1986, the female was knocked down and artificially inseminated. The female was restless for 24 hours. We feel the increase in activity, on 12 January, 1986, was due to post knockdown stress and not estrus. It appears the female was in estrus on January 6 to 8 and March 20 to 22. This would be a 50-day estrous cycle. However, once again we had no way to check our results. The project was discontinued in April due to lack of manpower. We did not have enough data collected to fully evaluate this method of detecting estrus.

The only methods that show any prospect of detecting estrus in the black rhino are monitoring vaginal discharge and motor activity. If we can utilize these two methods simultaneously, an estrous pattern might become apparent. Vaginal smears and vaginal temperature showed no indications of estrus. Our goal is to discover a reliable method of estrus detection in the black rhinoceros, and to achieve a pregnancy from artificial insemination.

Acknowledgments

Special thanks to the following people for their help and information: Joe Rindler, Columbus Zoo/Pachyderms; Dave Clawson, Columbus Zoo/Pachyderms; Carl Gyarmaty, Columbus Zoo/Herbivores; The Columbus Zoo staff; Dr. John D. Harder, Zoology Dept., The Ohio State University; and Dr. David Zartman, Chairman of Dairy Science, The Ohio State University.

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Editor's note: This paper was presented at the AAZK Great Lakes Regional Conference held in Columbus, OH May 4-7, 1986)



Viewpoint

Eclectic vs. exclusionary (revisited)

By

Dr. Kevin T. Patton

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St. Louis Community College (MO)

Bravo! to both Liz Arnold (in July '88 AKF) and Mark Hofling (in August '88 AKF) for their Viewpoint articles addressing my May '88 AKF Viewpoint "The Eclectic Animal Keeper". I had hoped that the article would stimulate some lively debate, and I am not disappointed. Since Ms. Arnold's views supported my position, I certainly won't argue with anything she wrote!. Allow me, please, to rebut some of the dissenting views expressed by Mr. Hofling.

First, Mr. Hofling seems offended that I suggested an alternative meeting time for my local chapter (St. Louis) so that non-zoo employees could attend. My goal was to point out that although this may be easy, it is not necessarily best, especially if outside ideas are to be sought. Apparently, Mr. Hofling doesn't approve of inviting "outsiders" like animal park employees or animal rehabilitators or exotic animal veterinarians to chapter meetings. I have expressed my opinion to my local chapter and they disagree, which is fine. It sure would be nice if they at least informed we non-zoo AAZK members when a meeting occurs, however.

Next, let me state that Mr. Hofling's whole paper outlined exactly the attitude that I feel is a detriment to any professional organization: provincialism. Mr. Hofling feels that all non-zoo animal professionals are greedy animal exploiters. I invite him to take a close look at how his bills get paid. His implication that because circus people and pet dealers pay their bills in the same manner as he (from money derived from maintaining captive animals) they are morally deficient sinks his own boat. I wonder if our local zoo director, Charlie Hoessle (VP of AAZPA), and other zoo professionals who got their start in the pet trades are aware of this supposed deficiency in their backgrounds!

Mr. Hofling's characterization of circus animal caregivers as having no expertise beyond muzzling bears and removing the canines of baboons is ludicrous and unprofessional. First, performing bears are only muzzled for a few minutes a day to prevent gruesome maulings of spectators while they are out of their pens. Secondly, there aren't more than two dozen or so performing baboons in this country, some of whom still have their canines. Any canines that were removed were done mostly by zoo vets, some by other vets. Mr. Hofling has absolutely no idea, apparently, that zoo curators often seek the advice of circus trainers Smokey Jones and Buckles Woodcock on elephant handling. Retired circus trainer Robert Baudy has supplied numerous zoos with rare specimens from his collection. I, a part-time circus trainer, have a PhD in captive animal biology (and I'm not the only one like that). Mr. Hofling's rather bizarre attitude is not founded on any real facts, just some myth he must have heard. I don't really care what he thinks of circus people, but it sure is a shame that he won't let his chapter members at least hear what is going on in this area (even if they disagree with the methods described).

Mr. Hofling's statement that the pet trade is responsible for the depletion of some natural animal populations is true. So are zoos. I wonder if he has heard of the recent controversy over Western zoos' importation of giant pandas and its adverse effects on that species. As a former pet dealer, I know that many in the industry do not condone wild-catching of exotics. Not only do these (majority) of dealers speak out at professional meetings and in print, they practice what they preach. Many breed their own pet stock captively and

Viewpoint. *Continued*

contribute to the scientific literature on exotic animal breeding. It's funny, too, that some of my best customers were zoos (some of them the recipient of a lot of free advice from our non-zoo company). Once again, if one doesn't like the pet trade that is OK, but how can anyone say that no pet dealer has anything to offer a zoo keeper?

Overall, Mr. Hofling seems very impressed with himself as a zookeeper and seems to absolutely abhor the idea that any non-zoo employee can possibly know anything about the "right way to do things". His provincial (zoo with a capital Z) attitude is prejudiced against animal keepers with more experience in animal keeping and expertise in a variety of methods and approaches than Mr. Hofling is likely to have for many years to come.

Once again, I really can't see how increasing the cosmopolitan atmosphere of AAZK (like all other professional organizations) will create a shifting foundation. Mr. Hofling's vision of an elitist, exclusionary club is doomed to failure if it becomes a reality. Let's hope it doesn't.

Postscript:

Perhaps Mr. Hofling's response is an indication that I failed to adequately express the thesis of my original article. Since my first membership in AAZK over ten years ago, midway through my 5-year stint as a zookeeper at the St. Louis Zoo, I have continually sought to increase my knowledge of animal care and species conservation techniques. Since that time, I have found an incredible wealth of insight and information from what some zoo employees consider unlikely sources. The goal of my original article, and one of my personal goals as an AAZK member (albeit non-voting), is to educate this profession that an institution need not have "zoo" in its corporate title to be a zoological institution. Whether it sits right with our personal philosophies or not, research and educational facilities, some circuses, and rehabilitation centers are in fact zoological institutions (nor can we avoid the fact that public zoos are indeed a part of the entertainment industry). My point is that a zoo keeper is a professional exotic animal maintainer, regardless of whether his/her employer is a public zoo.

And the Discussion Continues with the following letter from Mrs. Kitty Mallory of Possum Walk Station, Roopville, GA.

Dear Editor:

As an Associate member of AAZK, I felt prompted to respond to Mr. Mark Hofling's letter, which appeared in the August AKF Viewpoint.

I have worked with exotic animals in the private sector for over 15 years. In addition to being a keeper for an animal import house, I also run an orphan marsupial nursing service, which is as about as demanding as animal care can be. I very much resent his attitude that only zoo employees care for their charges. He is also very outspoken regarding profits from animals--where does he think his salary comes from? I have left places of employment because the "management" cut back on the animal care budget to squeeze out a few more dollars profit.

I joined the AAZK because I believe in their basic concept--SHARE KNOWLEDGE. In the long run, our animals are the ones who benefit. Mr. Hofling seems to hold the belief that anyone outside of a zoo setting has nothing to offer, and that any suggestions they would have would be of minimal value. Maybe he should take the time to talk and listen to those of us who are dedicated to our animals. he might be surprised to find what we have to offer. After all, we live with our charges 24 hours a day, not 9 to 5.

Unfortunately for everyone, this type of attitude continues to alienate the zoo and private breeder. Why not drop the hostility, and share the rewards of mutual knowledge? While being a "circus trainer" does not necessarily condemn one to Hell, neither does employment in a zoo guarantee Sainthood.



Reproductive Behavior in the Black Lemur

Lemur macaco macaco

By

Marilyn Cole, Keeper Grade 3
Metro Toronto Zoo, Toronto, Canada

There are at least eight subspecies of the black lemur spread over the forested area of the island of Madagascar. Metro Toronto Zoo has kept the subspecies *Lemur macaco macaco* in its collection even before its official opening in 1974. On 9 May, 1973, two males and two females originating from Northland Wildlife in Miami, and Montreal Zoological Gardens, arrived at our zoo. These four founders and their offspring have produced a total of 30 infants, of which 20 have survived to adulthood.

As with other species, Metro Toronto Zoo has participated in an exchange of animals with other zoos in order to spread out the gene pool, and as a result four animals have been sent to Bristol Zoo in England, and one female has been traded to Lincoln Park Zoo for one of theirs. Some animals have also been sold, or have died after puberty, and our total population at the moment stands at 6 males, 7 females and four unsexed youngsters born in 1986. These animals are housed in family groups, both on site and in a holding and breeding barn off-exhibit.

On 21 July, 1979, an exhibit for black lemurs was set up in the Africa Pavilion, next to the gorilla enclosure in an area that was previously utilized as an office, aardvark cage and small mammal exhibit. The exhibit (which is approximately 16' wide by 8 1/2' high by 14 1/2' deep) consists of two plexiglass viewing windows on the front, surrounded by treated wooden slates, and a wire mesh ceiling. Keeper access is via a door from a passageway at the rear. There is some natural lighting coming through the plexiglass viewing windows, but primary lighting is provided by fluorescent fixtures and spot lamps above the wire mesh ceiling. Ventilation is provided by an electric fan mounted above and pointing down into the exhibit.

The floor is a concrete base, with sand and gravel added (which is completely changed periodically). A wooden shelf 8' x 2' is attached to one wall, and a large nestbox sits on the shelf. A wooden beam 10' long stretches from the front to the back wall for easy walking. Cedar and pine trees, with heavier cross-branching are attached around the walls of the exhibit. Feed bowls are placed on the large shelf. Access to the holding area provides additional space, and an area to escape the public when desired. Another food bowl and water bowl are placed in the holding area approximately 5' above the ground.

In 1979, 1.1 lemurs and their two offspring were put into the exhibit. During the period of their occupation of this exhibit, another three infants were born, two females and a male. An infant born in 1980 was euthanized at 26 days of age, when the other three occupants attacked the mother and infant, causing it severe physical damage.

In November 1980, we suddenly found ourselves with a gorilla infant who had been rejected by her mother at 19 days of age. Overnight the black lemur exhibit became a gorilla nursery, and the lemurs were housed in holding cages in the patas monkey area until they could be moved to another permanent holding area off-site.

In 1984, the gorilla nursery was no longer needed and it reverted back to a black lemur exhibit, with some improvements.

Reproductive Behavior in the Black Lemur, *Continued*

On 27 August, 1984, we in the Africa Pavilion received a different group of black lemurs than we had had previously. These included a male, Tahi, grandson of two of the original four, born 24 April, 1978; a female, Rua, granddaughter of the other two originals, born 12 March, 1978; and their twin daughters, Ruta and Nettie, born 7 May, 1983. After a brief period, they settled in well, and all of them lived harmoniously, as is the nature of wild black lemurs.

Their diet consists of chopped mixed fruit, supplemented with SA37 vitamin powder, as well as vitamin E powder; bean sprouts, about half a cup of monkey pellets and half a cup of monkey chow. Insects in the form of crickets and mealworms have been offered to them, but they have demonstrated little interest. Studies done in the lab on ring-tailed, mayotte brown, mongoose and ruffed lemurs indicated that all except the ruffed enjoyed live insects. The reason given for the ruffed lemur's exception is that it is a folivore, whereas the others are frugivores. The black lemur is also a frugivore, but this theory does not hold up at least with our group, who were not interested in any tasty live morsels. They do have a great love, however, for raisins and figs.

Food is eaten utilizing the hands to hold small food only; the mouth does all fine manipulations and produces some very comical gestures from the point of view of the visiting public.

Two bowls of water are made available to them, and they show a marked preference for the bowl placed on a shelf at a height of 5', as opposed to the bowl on the floor of the exhibit. The higher bowl is empty every morning; they drink by scooping water onto their fur, and licking the droplets off the fur, just as they would lick off droplets of rainwater from leaves or hollows in trees in Madagascar.

Black lemurs are interesting to observe and appealing in their appearance. Only the male is black, the females displaying a light brown fur with black heads and tufts of white fur along the sides of the face. With such marked sexual dimorphism it is easy, even at birth, to distinguish males from females. Unlike some primate groups, the males get along quite well together and a usual group consists of 9-12 members of both sexes. The females, however, are dominant over the males, and Rua frequently is aggressive towards her mate, Tahi, especially at feeding time, making it necessary to hand-feed him. Aggression consists of nose-poking, cuffing and biting, and Tahi sometimes appears totally cowed by his mate's attitude, adopting the submissive posture of head hunched down. However, for the most part, their relationship is peaceful. Indeed, they are often observed curled up together asleep, and Tahi does not particularly avoid Rua.

Their two daughters, although over one year old on arrival, still spent a good deal of time near their mother, and ran to her when frightened.

In common with other prosimians, the black lemurs uses ritualized scent-marking which seems to be a means of species recognition. Urine and feces are utilized, and the animal is also equipped with scent glands in the anogenital region which are rubbed on objects to leave the scent.

Lemurs have 36 teeth and use the four lower incisors and two canines as a dental comb. A claw has been retained on the second digit and is used as a scratching device or grooming claw, together with the dental comb. There is much mutual grooming between animals, providing an important social cohesion.

Besides scent-marking, the most important forms of communication are vocalizations and gestures. The black lemur has three basic calls - a grunt, a bark, and a sharp call. The sharp call is quite piercing in nature and is done whenever they are frightened or upset. For instance, whenever they see a mouse in their cage they take up the sharp call, accompanied by much pendulum tail-swinging. The mouth is pursed up during the call, and often the head is raised.

Reproductive Behavior in the Black Lemur, *Continued*

After the arrival of the 1.3 black lemurs to the old gorilla nursery, they settled in well and nothing too eventful occurred for the rest of 1984. No copulations were observed, but on 2 April, 1985 the older female, Rua, gave birth to a single female. She remained in holding by herself and was quite antagonistic towards the others, especially the male, which is typical of lemurs in general. She gradually allowed her two older daughters contact with the infant who remained tucked across the mother's ventral surface supported by her thigh. From the first week Rua spent a great deal of her time licking and grooming the infant with her lower incisors, and by the age of one month, the female infant was active and playful, frequently leaving her mother for short forays.

And then, on 29 May, Rua's older daughter, Ruta, gave birth to male twins. This birth is particularly interesting because we had never experienced this before. Up until then only one female per family group had been bred, and we considered them to have an inhibition to inbreeding, as occurs in some other primate species. For instance, our adult male mandrill Willy has not attempted to copulate with his daughter, Anne, even though she had had estrous swellings, and he has allowed his young son to copulate with her--something quite unprecedented for Willy.

The twins were Ruta's first birth and she was rather nervous, moving her resting area finally into the nestbox. But two days later, one of the infants was found dead on the floor beneath its mother. The remaining infant seemed fine, but there was evidence of fighting. On 10 June tufts of hair were found on the floor, and Ruta seemed very subdued; consequently she was separated into the holding area by herself. On 15 June, things seemed to have settled down and Ruta was again given access to the other lemurs. By this time the infant was climbing onto its mother's back. However, on 25 June, Ruta received a deep cut on her foot from her own sister Nettie. Nettie was separated into the holding area for a few days and then returned to the group. Nettie's aggression towards her sister Ruta continued and she was finally removed from the group in order to provide a more peaceful environment for the two thriving infants.

It is interesting to note that Ruta and Nettie had gotten along very well until the birth of the twins; was Nettie's aggression caused by jealousy? One can only speculate.

By 31 August, 1985, it was the father's turn to be bothered. Tahi was being harassed by both females and the holding area was left open at all times to provide more room for the growing family. This took the pressure off for awhile until 17 Oct. when Tahi received a minor bite on his right arm. No further aggression was seen and, in fact, copulation was observed between the two older animals on 23 Nov. and 29 Dec. In Madagascar the breeding season is April-June with births occurring from Sept. to Nov. However, the season has been reversed for black lemurs kept in the northern hemisphere. At Metro Toronto Zoo, by far the majority of births have occurred in March and April, with a few in Feb., May, June and July.

In order to prevent Tahi from breeding his daughter again, Ruta has now been sent to Bristol Zoo on a breeding loan. In the meantime, Rua's infant daughter died as a result of kidney failure on 24 February, 1985. Her symptoms, which came on suddenly, included lethargy and weakness, and no cause has been determined.

With one departure and one death, we are now left with 2.1 black lemurs in our display area. The two males get along very well, as would be expected with this species, and they still provide a very active exhibit.

In conclusion, black lemurs are a threatened species in the wild but breed readily in captivity. However, it is necessary to monitor father/daughter and mother/son copulations in order to avoid inbreeding.

We have always tried to maintain this species in pairs and have had no incest occur up until this point. In the holding barns there is no pressure to keep large numbers together, and the offspring are removed soon after they reach sexual maturity. As a result we have

Reproductive Behavior in the Black Lemur. *Continued*

never given the males too much time to be with their sexually mature daughters. This may have given us the false impression that the pairs were monogamous, and that there may have been a father/daughter mating block.

For our display group, the pressure was to maintain a large number to keep the exhibit active and interesting to the public. Since there was no aggression amongst the inhabitants, this was allowed to continue until the inbreeding occurred. We are now far more cautious in our management, realizing that there may be no incestual block for this species.

It is therefore important for zoos to consider the spatial restraints in maintaining species, not just at the present time, but looking ahead to future management needs, so that such a situation as occurred with our black lemurs can be dealt with before it arises.

(Editor's note: This paper was presented at the AAZK Great Lakes Regional Conference held in Columbus, OH May 4-7, 1986)



Endangered Species UPDATE

*A Publication for information
exchange on*

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*Includes a reprint of the latest
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Legislative Outlook

By
John Stoddard
AAZK Legislative Advisor
Brookfield Zoo, Brookfield, IL



Chimpanzee status reviews initiated by FWS

In response to a petition submitted jointly by the Jane Goodall Institute, World Wildlife Fund, and Humane Society of the United States, the Fish and Wildlife Service has initiated a status review of the chimpanzee (*Pan troglodytes*) and the pygmy chimpanzee (*P. paniscus*). Both species are currently listed by FWS as Threatened.

The petition, which was submitted to the FWS in November of 1987, indicated that the status of *P. troglodytes* has deteriorated substantially since it was classified as Threatened in 1976, warranting a change in status to Endangered. Among the threats said to face this species are massive habitat destruction, fragmentation of populations (and the associated vulnerability to disease), excessive hunting and capture by people, and inadequate national and international controls. International trade in chimpanzee infants for the biomedical research market is also considered to have a significant impact on the species in the wild.

After examining the petition, the FWS concluded that it contains "substantial information indicating that the requested action may be warranted," and a status review was begun. Although the petition referred specifically to *P. troglodytes* the FWS is including the pygmy chimpanzee in the review because the closely-related species also inhabits the tropical forests of Africa and most likely faces the same threats. A comment period expires on 21 July 1989, at which time the FWS will consider all the information and decide whether or not to propose reclassification of both species.

> *From USFWS Endangered Species Technical Bulletin (April 1988)*

African Elephant Conservation Act passes House

On 2 August the House Fisheries, Wildlife Conservation and the Environment Subcommittee held a mark-up of H.R. 2999, the African Elephant Conservation Act. An amendment in the nature of a substitute bill was offered which would allow the continued importation of ivory from nations that are effectively protecting their elephant populations and controlling poaching but which conduct limited and sustainable harvests of elephants within their borders.

The amendment requires the FWS to evaluate the elephant conservation programs of the African nations and determine within one year whether the programs meet a set of criteria set forth in the bill. If they do not, the bill bans the importation of ivory from those countries.

Individuals would be allowed to import sport-hunted elephant trophies that have been legally taken in an ivory-producing country that has submitted a quota consistent with the CITES Ivory Control System. It establishes an Elephant Conservation Trust Fund to finance elephant conservation and anti-poaching projects in Africa. The sources of revenue for the fund include donations, penalties collected pursuant to this Act, and appropriated funds.

Legislative Outlook, *Continued*

Finally, within three months after the 8th Conference of the CITES Parties, the Secretary of the Interior must determine whether this Act together with the CITES Ivory Control System has substantially stopped the importation of illegally harvested ivory into the United States. If that trade has not been substantially halted the Secretary shall recommend modifications to this Act including the imposition of a complete moratorium on the importation of ivory.

On 4 August the bill was marked-up by the full Merchant Marine and Fisheries Committee. One clarifying amendment was offered. The bill was reported by the Committee to the full House and was passed on 8 August.

The House Merchant Marine and Fisheries Committee staff hopes to have this bill enacted during this session of Congress. This will be difficult to accomplish, however, because the Senate has not considered similar legislation and because of the short time remaining before Congress adjourns.

> *From AAZPA Newsletter (September 1988)*

Regulations proposed for incidental take of marine mammals

In the 15 March *Federal Register* the FWS (Department of the Interior) and the National Marine Fisheries Service (NMFS, Department of Commerce) jointly published regulations to implement recent amendments to the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA). These amendments provide a legal mechanism for allowing certain incidental takings of Endangered, Threatened, or "Depleted" marine mammals. Previously, incidental take of marine mammals designated as Depleted was not allowed under the MMPA. The amendments were designed to make the two laws more consistent, and the proposed changes in the regulations would implement those changes. A comment period concerning the changes expired on 16 May.

> *From USFWS Endangered Species Technical Bulletin (April 1988)*

FWS listing changes — protection approved

Louisiana pearlshell

Endangered

(Margaritifera hembeli)

This freshwater mussel or clam is endemic to a single drainage, the Bayou Boeuf, in Louisiana. Reservoir construction, pollution, and siltation from land disturbances in the watershed have degraded the pearlshell's aquatic habitat and reduced its range to only a few headwater streams. Most of the remaining habitat is within the Kisatchie National Forest, and the Fish and Wildlife Service will work with the U.S. Forest Service to design logging operations to produce less harmful runoff.

> *From USFWS (Endangered Species Technical Bulletin, March 1988)*



A Report on the Fourth All India Meeting of Zoo Managers Trivandrum, June 23-24, 1988

By
Sally Walker, Chairperson
Zoo Outreach Organisation, International

Although public zoos had been established in India more than 130 years, the first All-India Zoo Superintendents meeting was not held until 1956. At that meeting, however, very advanced concepts of zookeeping were mooted including the formation of invertebrate zoos!

Due to a lack of sustained coordination and communication, issues discussed at this meeting were not followed up. The next meeting took place only in 1982 in New Delhi. At the New Delhi meeting two very important subjects, among others, were discussed: the formation of an all-India Association of Zoo Directors and also the maintaining of studbooks for Indian species. At this time studbook assignments were made to zoos which had bred well or were located in the natural habitat of certain rare Indian species.

Again there was much too long a gap between meetings, but the third was held in 1985 in connection with the New Delhi Zoo Silver Jubilee. Again the Zoo Association was discussed but it was decided for some reason NOT to register it and also to have the Director of Wildlife, Govt. of India (who is not a zooman) as the permanent chairman of the Association. Membership in the Association as proposed at the time was rather restrictive.

Since 1985 the Director of National Zoological Park, Mr. M. Kamal Naidu, who was Jt. Director, Wildlife at the time of the 1985 meeting and subsequently became Director of NZP and Coordinator of Indian Zoos, has been working extremely hard to establish a more congenial and workable cooperative spirit between the Indian zoos. As Director of NZP he set an example by freely placing single animals in other zoos, matching up singles even when it was not solely to the advantage of his institution, and in general trying to promote NZP as a sort of 'generous uncle' to the other zoos; which is as the National Zoo had been conceived on its founding in India's capitol 27 years ago.

Naidu's attempts to hold another all-India meeting were thwarted by a variety of political phenomenon and natural disasters, but finally in June 1988, it was agreed that the fourth meeting could be held. The oldest zoo in India (Trivandrum Zoo) and the oldest working zoo director (Mr. P.R. Chandran, Director, Dept. of Zoos and Museums of Kerela) hosted the conference.

It was significant to hold the conference in the South, well away from New Delhi, to establish that the National Zoo and the Wildlife Department, although taking a benevolent interest and initiating the conference, was not trying to dictate terms to the remaining zoos in India. It was also important to set an ambience and importance for the Conference which has now set a very high standard. This is of utmost importance for the zoos of India which have suffered from being the "low man" on the totem pole of the forest and wildlife hierarchy.

That Naidu's intuition in planning and projecting this meeting was entirely correct was much in evidence--good attendance, high spirits, enthusiastic participation in all discussions and quality of decisions taken and resolutions passed on various issues--justified his confidence in the group conscience of the Indian zoo community.

To encourage discussion Naidu planned the meeting in such a way that participants could freely and informally share their problems and solutions on the important aspects of zoo management--breeding and husbandry, education and research, and exotic animal medicine. The last and final session was devoted to discussion of the National Zoo Policy and the Indian Zoo Association. No formal papers were given, but every attendee participated by sharing his views and experiences on the above subjects.

All India Zoo Managers Meeting, *Continued*

There were many important issues discussed and resolved at this meeting, but perhaps the most important for the future of Indian zoos was the establishment of the Indian Zoo Association.

At this meeting it was decided to register the Association as a National organization in New Delhi. A schedule of memberships and fees was decided and the Association was opened up not only to recognized "zoos" and their directors, but also to other zoo and wildlife personnel and other zoos. The "Institutional Membership" category will consist of the voting members which will be the Directors of the recognized zoos. The other members will not have voting rights but there will be provisions for other zoos to prove themselves and be accorded "recognition" and subsequently Institutional Membership.

It was further decided that even other countries surrounding India which are very isolated from any sort of zoo community, should also be allowed to join and for that purpose the name was made Indian Zoo Association in lieu of Association of Indian Zoos.

Another significant decision was to make the head of the Association an elective office, decided yearly by the voting members who are all, of course, zoomen. The Secretary of the Association will be permanent as the Director of the National Zoological Park since he is located in the nation's capitol and has facilities and infrastructure for running the Association.



First left (standing a little apart) M. Kamal Naidu, Director, National Zoological Park, and Directors from Chhatbir Zoo, Kanpur Zoo, Nandankanan Zoo, Lucknow Zoo and Trichur Zoo before registration the first day of the Conference. The Nandi Bull in the background is a symbol of fertility in India, most appropriate for a Zoo conference > (Photo by Sally Walker)

All India Zoo Managers Meeting, Continued

It was decided to hold the next meeting in January at which time the final arrangements for the Association will be made. The January meeting will be held in Nandankanan Zoo on 22 -24 January 1989, and participants from surrounding developing countries will be included.

In addition to this important work, resolutions on the following subjects were passed and committees established to further study and implement the decisions taken: Zoo Vandalism; Menace of Stray Free-ranging Animals; Disposal of Animal Products; Import, Export and Exchange of Animals; Labor Problems; Displays, Publicity, Studbooks for Indian Species; Pricing of Animals; and Recording of Animal Births. One of the more important decisions made was to dispense with pricing of endangered species in consideration of exchange deals between Indian zoos and to consider first the conservation of the species before the individual benefit of the institution.

Altogether the sum of the Conference could be said to be that the Zoo Community of India is now an established reality with the Zoo Directors themselves taking responsibility for the wildlife and related issues in their care instead of having restrictions imposed from above. It was, many of us felt, the first REAL meeting of zoo personnel in India.

(The Proceedings of this meeting will be published as a special issue of ZOO's PRINT magazine later in 1988 and will be made available to zoo personnel outside the country as well. Write to Zoo Outreach Organization for information on how to obtain a copy. The address is: Zoo Outreach Organisation, Pioneer House, Peelamedu, Coimbatore, Tamil Nadu, INDIA, Pin 641-004.



Chapter News

Los Angeles Zoo AAZK Chapter

Sedgwick County Zoo AAZK Chapter

Our Chapter has been devoting its time to establishing an Explorer Post and sponsoring a zoo poster art expo. The Post has a regular attendance of approximately fifteen. As the new school year gets underway, we hope to add more to our group. The exhibit of posters designed for our zoo by local artists was displayed at various locations throughout the city. The expo included about 100 entries.

At the moment, our attention is turning to fundraising, a Chapter logo, and the upcoming Halloween parties hosted and held by our zoo.

--Kristi Flanders
Chapter Liaison

On 28 July, the Los Angeles Zoo AAZK Chapter hosted its annual potluck dinner and night walking tour through the zoo. This year's theme was "In Search of the Elusive Wombat". The event was so very successful that, even with the mountains of delicious food brought by the participants, Chapter officers had to make four additional food runs! Despite the food shortage, a great time was had by all, and the Los Angeles Chapter made a nice sum of money for its treasury. Proceeds from the night walk plus our upcoming October auction of zoo memorabilia will go towards the purchase of a video camera for use by keepers.

--Kim Brinkley,
Chapter Liaison

Chapter News, Continued

Bronx Zoo Chapter AAZK

In the month of August we had our annual barbecue. It was a wild and woolly success. Thanks to the generous contributions of many departments including horticulture, photography, graphics, souvenir, and admissions, we had great raffle prizes and lots of happy winners. Among the more coveted prizes were the W.C.I. Black rhino conservation T-shirt and a vintage photograph of William Beebe. Frank Leonard kept things cooking as chef, while our disc jockey Lee Schoen's music kept us all dancing into the moonlit hours. The proceeds totaling well over \$300.00 will go into our chapter's general fund.

The aluminum container recycling program continues to produce results. The money raised paid registration fees for two delegates to attend the AAZK National Conference in Tucson. The New York Zoological Society paid all expenses for Frank Leonard and Flo Klechna to attend. Flo gave a paper on sea lions.

--Wendy Worth
Corresponding Sec'y

Chapters are reminded to send information for the Chapter News column by the 15th of each month. Include new officers, projects, etc.

Zoo Atlanta AAZK Chapter

Zoo Atlanta AAZK recently revised and updated our by-laws and constitution. We have completed our new logo (gorilla & gavia).

We have started a new fundraiser, renting binoculars to zoo visitors to view gorillas and orangutans in our new rainforest exhibits. We have also started preparations for our Halloween Haunted House fundraiser.

--Tim Kurkowski
Co-Vice President

REMINDER: If your Chapter has not yet sent a copy of your Chapter logo for our file here at National Headquarters, we would appreciate it if you would do so. Having all Chapter logos on file is helpful when new Chapters are designing logos in order to avoid duplications.



Dolphin Husbandry at Sea World, Durban

By

*M. Fothergill
Curator, Marine Mammals
Sea World, Durban, South Africa*

For the purpose of this article, dolphin husbandry includes three broad categories: (1) water quality and temperature; (2) nutrition and (3) monitoring of health. As a result of a relatively recent improvement in international communication in the field of marine mammals, the scientific art of dolphin husbandry has progressed in leaps and bounds during the past ten years. This has resulted in a vast improvement in both longevity of captive animals and the success of breeding programs.

Water Quality

A variety of different systems are used in dolphinariums to maintain a high standard of water quality; this is not easy in view of the release of body wastes into the water by the animals. Sea World, Durban uses a system of marginal chlorination, (in our case with gas chlorine) to a level of 0.3 ppm of free chlorine* filtration and daily replacement of 10-15% of pool water. At this level most pathogenic bacteria are either killed or inactivated. The pH of the water is maintained close to that of seawater, i.e. 7.8-8.2, by the judicious addition of caustic soda. The water supply for the pools is pumped from wellpoints 6m below the sea bed, hence is pre-filtered. Particulate and fecal matter, which is not broken down by the chlorine, is removed from the system by means of continuous filtration of the water through a number of large sand/anthracite filters. Addition of a small quantity of ferric chloride, which acts as a flocculent, results in the removal of colloidal particles from suspension and renders them filterable. The system of marginal chlorination can only be used in situations similar to ours, where the total organic load, introduced to the pools in the form of dolphin fecal material and urine, is minimal in comparison to the total water volume. Thus, the production of chloramines, formed by the reaction of chlorine with organic matter, is negligible and consequently the dolphins do not experience any form of skin or eye irritation.

*Municipal tap water ranges from 0.2 to 0.5 ppm.

Water Temperature

Dolphins are insulated with a layer of blubber and are able to regulate their body heat by means of varying the blood supply to the fins and tail flukes where an efficient heat exchange system operating on the counter-current principle can be found. Although this heat exchange system can be used to dissipate heat, dissipation is limited to very high ambient temperatures. Consequently the pool water at Sea World is refrigerated during the hot summer months, in order to keep temperatures below 24°C (75°F).

Nutrition

A variety of species of fish, as well as squid, octopus and cuttlefish, form the diet fed to the dolphins. Fish is purchased from reputable fishing companies on the understanding that the fish is blast frozen and packed immediately after capture. Dolphins are extremely sensitive to poor quality fish, consequently purchases are limited to fish with a higher standard than usually acceptable for human consumption. This is stored in the dolphinarium deep-freeze at -30°C (-22°F) and the duration of storage never exceeds three months. Fish are thawed as quickly as possible in running sea water before being fed to the dolphins. New batches of fish are routinely sampled and tested for the presence of pathogenic bacteria.

A great advantage is derived from deepfreezing the dolphin's food fish, for all parasites

Dolphin Husbandry at Sea World, Durban. *Continued*

which could potentially infest the animals are killed by freezing. Yet the process also destroys the vitamin content of the food and supplementation is necessary with multivitamins and extra vitamin B1. Bacteria in the gut of the fish, when dead, multiply and produce the enzyme thiaminase. This enzyme breaks down the thiamin (B1) content of the fish. For this reason, vitamin B1 is dosed to the dolphins in proportion to their daily food intake. Vitamin tablets are inserted through the gill slits into the body cavity of fishes which are fed to the dolphins. Different species of fish can be used, by emphasis within the diet, to make allowances for an animal's physiological state. Squid, for example, is a gentle laxative and can be increased in the diet of a constipated animal. Pilchards/sardines can be used for an animal which is run-down, for their high nutrient content but never used in cases where an animal has or is recovering from a liver problem. Hake is a bland food, used as a filler. If a dolphin shows signs of dehydration, the water content of the food can be increased by the injection of fresh water interstitially.

Monitoring of Dolphin Health

The dolphins' health is monitored very closely. Once a month they are weighed in stretchers and blood samples are collected. The blood samples provide hematological and biochemical values, virus antibody levels, progesterone levels in the female dolphins, to establish occurrence of ovulations or pregnancies, cortisol levels and occasionally various serum vitamin levels.

The dolphins are also trained to blow out agar culture plates and give fecal or stomach fluid specimens. This is also done on a monthly basis (or more often if necessary) and enables us to establish each animal's normal bacterial flora. It is also possible to check for red blood cells (an indication of internal bleeding), excessive numbers of white cells (indicating infection or parasites) or the eggs of parasites. These trained behaviors, allowing sample collection, are in no way stressful. In fact it appears that most of the animal enjoy doing them.

Considerable experience is required to assess the well-being of a dolphin visually. Terrestrial predatory mammals such as those of the cat and dog family have a remarkable range of expressions and postures to display their feelings and have the organs and musculature designed specifically; it seems, for the task. In comparison, dolphins are expressionless and their body language is far more subtle. Their armory of appendages, suitable for the display of feelings is also much more limited. Hence a sharp eye is always kept on the animals by the trainers, who take careful note of any abnormal behavior or signs of illness, e.g. coughing, arching, excessive secretion from eyes or mouth, mucoid or gaseous feces, or stereotyped swimming patterns.

All symptoms which are noted and all results from the monthly health check-up are discussed by our animal health committee which is chaired by the Director and is comprised of two doctors, two veterinarians, the Curator of Marine Mammals and a microbiological technician. The meetings are held at regular intervals and members of the panel are available at all times for consultation.

If we are to keep dolphins captive, then their husbandry must be of the very highest standard. All advances that are made in this field are quickly incorporated into our system of husbandry. This is made possible through regular contact with the International Marine Animal Trainers' Association and the International Association of Aquatic Animal Medicine. Personal contact is also maintained with experienced veterinarians and curators worldwide. The healthy two-way exchange of information which results is mutually beneficial to ourselves, dolphinaria we are in contact with and to all captive dolphins.

Perhaps the most important aspect of husbandry is the attitude of the trainers to their animals, for all other care stems from this. Responsible trainers are invariably deeply involved with the animals which are in their care. It follows that the standard of care is exceptionally high.



AAZK Regional Coordinators

Co-Directors of Regional Coordinator System

States East of Mississippi - Diane Krug, Rt. 1, Box 273, Hilliard, FL 32097 (904) 225-9559 [work]
(904) 845-4279 [home]

States West of Mississippi - Debbera Stecher, Woodland Park Zoo, 5500 Phinney Ave., North, Seattle, WA
98103. (206) 625-5402 [work] (206) 745-8198 [home]

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VACANCY - for the states of ME, VT, NH, MA, RI, CT

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- for the states of NY, VA

John Brangan, Virginia Zoological Park, 3500 Granby St., Norfolk, VA 23504 [804] 441-2374 [w]
for the states of PA, DE, NJ, MD and the District of Columbia [804]625-5575 [h]

Bill Whittaker, Toledo Zoological Gardens, Toledo, OH 43609
for the states of MI, IN, KY, and OH

Chris Garland, North Carolina Zoological Park, Asheboro, NC 27203
for the states of NC, SC, TN, and W. VA

Colleen Kinzley, Brookfield Zoo, 3300 Golf Rd., Brookfield, IL 60513
for the states of WI, IL, MO, MN, and IA

Tim Kurkowski, Zoo Atlanta, Atlanta, GA 30315 (404) 624-5600 [w] (404) 292-6314 [h]
for the states of GA, AR and AL

VACANCY - for the states of LA and MS

Vikki Bohnert, 3515 Cobblewood Ct., #117, Winter Park, FL 32792 [407] 678-0879 [h]
for the state of Florida

John R. Turner, Denver Zoo, Denver, CO 80205
for the states of CO, NM, and TX

Steve Tigges, Tulsa Zoological Park, Tulsa, OK 74115
for the states of OK, NE, KS, ND, and SD

Elandra Aum, Woodland Park Zoo, 5500 Phinney Ave. N., Seattle, WA 98103 [206] 625-2244 [w]
for the states of WA, OR, ID, MT, WY and AK

Art Goodrich, San Diego Zoo, San Diego, CA 92112
for the states of CA, NV, UT and AZ

Honolulu AAZK Chapter (Dan Vitiello, Pres.) (808) 923-4772 [w]
for the Hawaiian Islands

Terry Male, Metro Toronto Zoo, Box 280, West Hill, Ontario, Canada M1E 4R5
for the Province of Ontario, Canada

Bob Debets, Assiniboine Park Zoo, 2355 Corydon Ave., Winnipeg, Manitoba, Canada R3P 0R5
for the Province of Manitoba, Canada (204) 489-3893 [h]

Marcia Rasmussen, Calgary Zoo, P.O. Box 3036, Stn. B., Calgary, Alberta, Canada T2M 4R8
for the Provinces of Alberta and British Columbia, Canada (403) 235- 5461 [h]

AAZK would like to announce the following new RCs: Elandra Aum for the states of WA,OR,ID,MT,WA and AK; Colleen Kinzley for the states of WI,IL,MO,MN and IA; and John Brangan for the states of PA,DE,NJ,MD and Washington, DC. Also please note a change of address for Vivki Bohnert, RC for the state of Florida. Vacancies still exist for (1) the states of LA and MS and (2) the states of ME,VT,NH,MA,RI and CT. If you are interested in either of these RC positions, please contact one of the RC Co-Directors for more information.

Until the vacancies are filled, those who have questions should contact the following individuals who are temporarily covering the states with vacancies: Tim Kurkowski, Zoo Atlanta, for the States LA and MS; and Chris Garland, North Carolina Zoo, for the States of ME, VT,NH,MA,RI and CT.

Need membership information? Want to learn more about AAZK or start a Chapter or become more active - then call your RC! They will be glad to assist you with any information you need about AAZK.



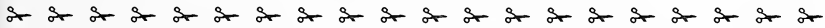
AAZK Diet Notebook Mammals, Volume 1

ORDER FORM

The AAZK Diet Notebook, Mammals - - Volume 1 contains approximately 325 diets representing 213 species and subspecies from fourteen participating institutions. The diets are arranged by taxonomic order using ISIS numbers in a durable and attractive three-ring binder. Each Diet Response Form included in Volume 1 contains the following information: common name, scientific name, ISIS number, the contributing individual, their institution and its address, how long the diet has been used, whether the animals have bred while on the diet, the diet ingredients, instructions for preparation, notes and remarks, special considerations and nutritional analysis (if available).

The Diet Notebook is a copyrighted publication of the American Association of Zoo Keepers, Inc., and may be ordered by filling out the following form and sending it, along with a check or money order (U.S. FUNDS ONLY) made payable to "AAZK Diet Notebook" to: Diet Notebook Order, AAZK, 635 Gage Blvd., Topeka, KS 66606 U.S.A.

Cost of the Diet Notebook is as follows: 1) AAZK Members \$40.00; 2) Non-members \$55.00; 3) Institutions \$70.00. These prices represent prepaid order prices and include postage for the U.S. and Canada. Those placing orders from overseas should contact AAZK Administrative Offices, 635 Gage Blvd., Topeka, KS 66606 for additional postage charges. Please allow 4-6 weeks for delivery.



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I wish to order _____ copy (ies) of the AAZK Diet Notebook.

(check one)

AAZK Member _____ Non-Member _____ Institution _____

Total amount enclosed: \$ _____

Name: _____

Address: _____

City: _____ State/Province: _____

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ALL ORDERS MUST BE PREPAID

Institutions wishing to advertise employment opportunities are asked to send pertinent data by the 15th of each month to: Opportunity Knocks/AKF, 635 Gage Blvd., Topeka, KS 66606. Please include closing dates for positions available. There is no charge for this service and phone-in listings of positions which become available close to deadline are accepted.

ANIMAL KEEPER/MAMMAL DEPT... salary \$14,000. Each candidate must have graduated from an accredited high school and have one year experience (paid) in the care and handling of a variety of mammals, excluding pets; or have graduated from an accredited high school and have 6 months experience in the care and handling of animals in a zoological institution; or have a bachelor's degree from an accredited college or university in biology, zoology, animal science or veterinary technology. Eligibility for a driver's license is required. This is an entry level position under the direct supervision of a Senior Keeper and/or Curator. All resumes to be sent to: Personnel Department, Baltimore Zoo, Druid Hill Park, Baltimore, MD 21217

ANIMAL KEEPER/BIRD DEPT... salary \$14,000. Each candidate must have graduated from an accredited high school and have one year experience (paid) in the care and handling of a variety of mammals, excluding pets; or have graduated from an accredited high school and have 6 months experience in the care and handling of animals in a zoological institution; or have a bachelor's degree from an accredited college or university in biology, zoology, animal science or veterinary technology. Eligibility for a driver's license is required. This is an entry level position under the direct supervision of a Senior Keeper and/or Curator. All resumes to be sent to: Personnel Department, Baltimore Zoo, Druid Hill Park, Baltimore, MD 21217

ANIMAL TECHNOLOGIST... requires BA in biology, zoology, or related field, one year of directly related experience, certification as a registered veterinary technician or equivalent, and ability to assist in surgical procedures. One year of responsible experience in working with animals or in a diagnostic laboratory may be substituted for one year of college education. Salary \$13,500-\$22,525.

ZOOKEEPER (All animal classifications)...requires high school diploma or GED and one year's paid, full-time experience with exotic animals or graduation in an animal technology course. Salary \$12,480-\$14,460.

For either of the above positions, send resume to: John Werler, Director, Houston Zoo, 1513 Outerbelt Drive, Houston, TX 77030.

BIRD KEEPER... requires experience with incubators and hand-raising. Knowledge of bird diseases desirable. Will assist in developing the collection in a new zoo.

ELEPHANT HANDLER... requires experience. Will manage, maintain and train elephants, present demonstrations and operate rides.

For either position, send resume and salary requirements to: Robert Evans, General Curator, The ZOO, 5801 Gulf Breeze Parkway, Gulf Breeze, FL 32561.

ZOO-WIDE INTERNSHIPS... provides experience in informal education, not-for-profit business, museum/zoo administration, exhibit management and theatre/presentation techniques. Salary \$100/week. For more information contact: Hedy Cerwinka, Philadelphia Zoo, 34th & Girard Ave., Philadelphia, PA 19104 (215) 243-1100.

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AAZK Membership Application

Name _____ Check here if renewal []

Address _____

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All members outside the
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Directory Information: Zoo: _____

Work Area: _____ Special Interests: _____

Mail this application and check or money order (U.S. CURRENCY ONLY PLEASE), payable to American Association of Zoo Keepers, Inc., to: AAZK National Headquarters, Topeka Zoo, 635 Gage Blvd., Topeka, KS 66606.

Membership includes a subscription to 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 for consideration.

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 no more than 6" x 10" (15cm x 25 1/2cm). Literature used should be cited in the text and in final bibliography. Avoid footnotes. Include scientific name of species the first time it is used. Thereafter use common name. Black and white photos only accepted.

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. Telephone 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 Ext. 31.

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

*Articles printed do not necessarily reflect the
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Animal Keepers' Forum

November 1988



Yonetani

Dedicated to Professional Animal Care

ANIMAL KEEPERS' FORUM, 635 Gage Blvd., Topeka, KS 66606

Editor-in-Chief: Susan Chan
Assistant Editor: Alice Miser
Assistant Editor: Ron Ringer

November 1988
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Number Eleven

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Keeper Training Materials Identification

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Biological Values/Gestation

Greater S. F. Bay Area Chapter

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By-Laws Review

Marilyn Cole, Metro Toronto Zoo

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Nominations & Elections

Rachel Rogers, Miami Metrozoo

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States East of the Mississippi - Diane Krug, White Oak Plantation, Yulee, FL

States West of Mississippi - Debbera Stecher, Woodland Park Zoo, Seattle, WA

Individual Regional Coordinators and the states they oversee are listed elsewhere in each issue of AKE.

This month's cover features Phoenix Zoo Keeper Tawny Carlson and 15-year-old Ruby, an Asian elephant (*Elephas maximus*). Ruby was featured in an article by Tawny in the June 1988 issue concerning the incorporation of painting in the Phoenix Zoo's elephant management program. The cover was drawn by Yoshi. Yonetani, an AAZK member and gifted artist from Zoo/DEL, Zoo Design & Education Lab in Kobe, Japan. Yoshi invites other AAZK members to send him photos of themselves with their animals to be translated into cover art for **AKF**. His address is: Yoshi. Yonetani, Zoo/DEL, 2-15, Nagate 1-chome, Nada-ku, Kobe, Japan 657. Thanks, Yoshi!

Scoops and Scuttlebutt

Knoxville Chapter Seeks Input on Chapter Formation

The Smoky Mountain Chapter of AAZK (chartered in 1987) is assembling materials which would be of use to others interested in forming new chapters. Accounts of successful and/or unsuccessful experiences in the birth process of establishing chapters are being sought. Please send relevant information or suggestions to: Carol F. Newsom, Knoxville Zoo, P.O. Box 6040, Knoxville, TN 37914.

From the Editor

An addendum needs to be added to an article published in the October 1988 issue of **AKF**. The article "Dolphin Husbandry at Sea World, Durban" by M. Fothergill, Curator of Marine Mammals (page 328) should have included the reprint credit line: The following article is being reprinted from *The Naturalist*, Vol. 31, Part 2, July 1987 with permission of Professor Alan Bowmaker, Director, Sea World, South Africa. Our apologies for inadvertently leaving the credit line out.

Attention all B&H contributors: Beginning with the January 1989 issue of **AKF**, we will no longer publish submissions which consist only of a numerical listing of births and hatchings. We have tried in the past year to encourage contributors to submit their B&H information in a text format, noting why these B&H are significant to their institutions (i.e., first ever captive reproduction, first ever for the facility, first second-generation, SSP species, reproduction due to change in exhibit or husbandry techniques, etc.) Two good examples of how we would like submissions sent are those from the Columbus Zoo and Bronx Zoo in the October 1988 issue (page 302-303). We would also ask that all those submitting B&H please include the scientific name (as per ISIS) following the common name of species listed. We greatly appreciate those individuals who have continued to submit material for B&H and our goal is to make this section of **AKF** not only more readable and interesting, but to include reproduction data in a context where it may be more valuable to anyone seeking information of captive exotic animal births and hatchings. We know it will mean a little more work on your part, but we feel the effort will be well worth it and we appreciate your assistance.

A Request from Across the Sea

We receive mail from throughout North America, the Far East and many parts of Europe. However, we rarely hear from someone in a country behind the Iron Curtain. Such a request was received recently and we hope you may be able to help out. We received a letter from a 20-year-old Polish student who has a great interest in zoos. This student has been collecting postcards, guidebooks, pamphlets and photographs from European zoos since 1983. He would now like to collect materials from U.S. zoos. If you have any such materials you would like to share, they may be sent to: Knop Renata, Wilenska 59/47, 95-200 Pabianice, Poland.



Coming Events

Association of Zoo Veterinary Technicians Eighth Annual Conference

Nov. 4-6, 1988

Toronto, Canada

To be held at the Hotel Sheraton Centre. Topics will include: handrearing the infant orangutan; reproductive research in embryo transfer; and reptile medicine, including anaesthesia of venomous snakes. Registration fee of \$100 includes attendance to all presentations, luncheons, and banquet dinner. A copy of conference proceedings, as well as local transportation are also provided. For information, contact: *AZVT Vice-President, Virginia Crossett, Louisville Zoo, P.O. Box 32750, Louisville, KY 40233 or call (502) 459-2181.*

Ninth Annual Elephant Workshop

Dec. 7-10, 1988

Jacksonville, FL

Hosted by the Jacksonville Zoological Park. For further information contact: *John R. Meyer, P.O. Box 26727, Jacksonville, FL 32218 or call (904) 757-4463.*

NOTICE: The Scholl Conference on the Nutrition of Captive Wild Animals will not be held in 1988. The next Nutrition Conference will be held in late 1989 at the Lincoln Park Zoo. Any persons interested in submitting papers for the 1989 conference should contact: *Dr. Thomas P. Meehan, Lincoln Park Zoo, 2200 N. Cannon Dr., Chicago, IL 60614 (312) 294-4689.*

Restoration: The New Management Challenge

Jan. 16-20, 1989

Oakland, CA

First annual conference of the Society for Ecological Restoration & Management Program will include papers, poster sessions and special lectures and workshops on the topics of restoration of national parks and on setting standards for the evaluation of restored ecological communities. Abstracts of papers must be received by **15 Nov. 1988** to be considered. For further information and registration forms write or call: *S.E.R.M. Annual Meeting, 1207 Seminole Highway, Madison, WI 53711 (608) 263-7889.*

Wildlife Rehabilitation Symposium

March 22-26, 1989

Anaheim, CA

Hosted by Pacific Wildlife Project. Topics will include: veterinary advances in wild species; rescue, restraint and handling techniques; avian, reptile and mammal treatment and biology; captive breeding; wildlife urbanization; post-release and population studies; cage design; conservation education programs; administration and project fundraising. Concurrent presentations will be offered for beginning, advanced and professional levels of expertise. Professional sessions will be limited to veterinarians and medical professionals. Those interested in submitting manuscripts contact: *Richard E. Evans, DVM, MS., NWRA Program Chair, P.O. Box 7671, Laguna Niguel, CA 92677, (714) 831-1178.* For other information or registration materials contact: *MWRA Host Committee, Pacific Wildlife Project at the address above.*

Coming Events, Continued

Fertility in the Great Apes

June 15-17, 1989

Atlanta, GA

Sponsored by Yerkes Regional Primate Research Center of Emory University, Zoo Atlanta and the National Zoo. For preregistration and information contact: Dr. Kenneth G. Gould, Yerkes Regional Primate Research Center, Emory University, Atlanta, GA 30322 (404) 727-7720.

AAZPA REGIONAL CONFERENCES

AAZPA Great Lakes Regional: March 5-7, 1989. For more information contact: Mike Blakley, Curator/Mammals, Kansas City Zoo, 6700 Zoo Drive, Kansas City, MO 64132 (816) 333-7406.

AAZPA Western Regional: March 19-21, 1989. For more information contact: Murray Newman, Ph.D., Director, Vancouver Public Aquarium, P.O. Box 3232, Vancouver, B.C., Canada V6B 3X8 (604) 68503364.

AAZPA Southern Regional: April 2-4, 1989. For more information contact: Terry Maple, Ph.D., Director, Zoo Atlanta, 800 Cherokee Ave. SE, Atlanta, GA 30315 (404) 624-5600.

AAZPA Central Regional: April 16-18, 1989. For more information contact: Hayes Caldwell, Director, Caldwell Zoo, P.O. Box 428, Tyler, TX 75710 (214) 593-0121.

AAZPA Northeast Regional: April 30-May 2, 1989. For more information contact: Minot Ortolani, Director, Buffalo Zoo, Delaware Park, Buffalo, NY 14214 (716) 837-3900.



Articles from current issues of RATEL and THYLACINUS (contact Editors for reprints/back issues)

RATEL, Vol. 15, No. 5, October 1988 - journal of the Association of British Wild Animal Keepers. Editor: Mrs. June Sherborne, 12 Tackley Road, Bristol BS5 6UQ, England.

1. "A Survey of Lemurs from the Genera *Lemur* and *Varecia* kept in British Zoological Establishments with Special Reference to *Varecia*" by Simon Blackwell
2. "Manipur Deer Breeding Well in Indian Zoos" by Sally Walker
3. "Looking at Mammals - Part 5 (subfamily Caprinae)" by John Partridge

Thylacinus, Vol. 13, No. 2, Winter - journal of the Australasian Society of Zoo Keepers. Editor: John Birkett, A.S.Z.K. P.O. Box 74, Parkville, Vic. 3052, Australia.

1. "Giant Pandas Visit the Metro Toronto Zoo" by Richard Johnson
2. "New and Unusual Experiences Around Adelaide" by Gert Skipper
3. "The Hand-rearing of a Common Marmoset (*Callithrix jacchus*)" by Graham Cook
4. "Red Pandas (*Ailurus fulgens*) at Adelaide Zoo" by Graham Cook
5. "The Breeding of Tuataras in the wild and in captivity in New Zealand" by Barbara Blanchard



Births & Hatchings



Bronx Zoo...the Bronx Zoo Chapter announces with pride the following significant births and hatchings for the months of August and September. The Dept. of Mammology is excited by the birth on 2 September of a male Lowland gorilla (*Gorilla gorilla*). These majestic and intriguing primates are endangered in nature and are listed as CITES I. There is a Special Survival Plan for them in which the Bronx Zoo actively participates. This infant gorilla is being foster-reared by Caroline Atkinson with assistance from Lisa Mieke and Louisa Gillespie. They have successfully foster-parented many other gorilla offspring, two of which, 19-month-old Koga and 13-month-old Lucy, delight the public daily with their playful personalities at the Ape Nursery. The new baby is the first fathered by Barney who is on breeding loan from the Toronto Zoo.

1.2 Silvered leaf monkeys (*Presbytis cristatus*) were born in August and September. The infants are bright orange when born so that they can be easily recognized by all members of the troupe. The females of all ages enjoy the newborns, taking turns holding and looking after them, even some of the juvenile males join in. As the babies mature they darken in color from the extremities inward, often beginning with the brow. The change in color varies with the individual and has been known to start as early as a month, but its completion usually coincides with weaning at about six months. These births bring the total born since Jungle World's inception, June 1985, to 17.

0.0.2 Rodriguez fruit bats (*Pteropus rodricensis*) were born in August. These rare bats can only be found in nature on one island, Rodrigues Island, in the Indian Ocean. Their population has been drastically diminished by deforestation, reduced from several thousand to several hundred in just 25 years. They can be seen in the World of Darkness. A male Pen-tailed bettong (*Bettongia pencillata*) came out of his mother's pouch on 20 August. These bouncy marsupials are listed as endangered. In nature, they would spend their day in a nest in the grass and emerge at night to feed on herbs, grasses, roots, and tubers. At the Bronx Zoo they can be seen in the World of Darkness.

On 2 September a female Pudu (*Pudu pudu*) was born. These tiny deer, native to Chile and Argentina, are endangered and listed as CITES I. 1.2 Formosa sika deer (*Cervus nippon tiawanus*) were born. This is one of the few species of Cervidae to retain its spots year-round. On 29 September, 0.0.2 Babirusa (*Babirusa babyrussa*) were born. The birth rate of Babirusa is lower than other wild pigs, only one or two progeny being born at a time.

The Dept. of Ornithology is pleased with the hatching on 10 September of a Green-napped pheasant pigeon (*Otidiphaps noblis*). The hand-rearing of squabs in the pigeon family is often problematic due to the difficulty in simulating the crop milk the hen produces. The San Diego Zoo has worked out a diet that they have been successful with based on equal weights of egg whites and water. Our Curator of Ornithology, Dr. Christine Sheppard, and our Nutritionist, Dr. Ellen Dierenfeld have augmented it with calcium carbonate and a frugivorous pellet both ground into the egg mixture. The chick is doing well.

Another Malayan peacock pheasant (*Polypectron malacense malacense*) was hatched adding to the Bronx Zoo's important collection of these lovely birds.

The Dept. of Herpetology is pleased with the births on 9 August of 0.0.7 Asian tentacled water snakes (*Erpeton tentaculatum*). There have been a total of 60 births this year from the group of 3.7 adults.

Births & Hatchings, Continued

On 2 September, 0.0.5 Dwarf caiman (*Paleosuchus palpebrosus*) hatched. These interesting reptiles are listed as CITES II and are found in only 17 other zoos. This is the eighth species of crocodylian hatched at the Bronx Zoo. *submitted by Wendy Worth, Corresponding Secretary, Bronx Zoo AAZK Chapter, Bronx, NY.*

San Diego Zoo and San Diego Wild Animal Park...the Zoo's Bird Dept's already long list of "firsts" grew this past summer with the hatching of five buff-crested bustards - the first captive hatchings for this species. A thick-billed parrot hatched on 3 September and was the first hatching at the zoo since 1965. In 1965, the Zoological society won a Bean Award for hatching thick-bills. When it fledges, this chick will go to Arizona to become part of the release program which is reestablishing these parrots in the wild.

On 8 August, six Uracoan rattlesnakes hatched. These rattlers come from the Uracoan Valley in Venezuela and are not often bred in zoos. On 18 September, a Fijian iguana laid a clutch of eggs. The San Diego Zoo is one of the only zoos in the U.S. to breed and raise to adulthood these handsome lizards.

The Wild Animal Park is celebrating the 74th and 75th captive births of the endangered southern white rhino. A female named Uzima, "health" in Swahili, was born on 4 August. On 14 October another female named Mwivi, Swahili for "thief", was born. Mwivi's mother, a wild-caught named Majuba, has produced seven previous offspring at WAP. The rather is Rahisi, wild-caught in 1968. Of the 75 southern white rhino born at the Park, only nine remain in the present herd of 19. Most offspring have been sent to other zoological facilities in the U.S. and abroad, including some as far away as Germany, China and New Zealand. Future plans call for the development of a program to breed the northern white rhino, which is far more rare than the southern subspecies with only nine in captivity and an estimated 23 in the wild. 1.1 northern white rhinos will arrive at SDWAP next spring from the Dvur Kralove Zoo in Czechoslovakia, joining the Park's lone male to form a herd. Also planned is a program involving the rare Sumatran rhino, a species not currently found in North American zoos. The Wild Animal Park will be one of four U.S. zoological facilities to receive wild-caught Sumatran rhinos. *from The Keeper, newsletter of the San Diego Zoo AAZK Chapter, October 1988 and SDWAP News Release, October 14, 1988.*

Sea World (San Diego)...in September, two Commerson's dolphin calves were born and appear to be thriving, thus expanding our knowledge about the reproductive physiology of these tiny cetaceans. And of course, there was the much-publicized birth of a killer whale calf, known as Baby Shamu, on the 23rd. The Animal Care and Animal Training departments are keeping a 24-hour watch on the baby whale in order to gather information on nursing rates and general behavior. Only three days after the birth of this calf, its father, Orky, died. He was believed to be about 30 years old. However he did leave behind a legacy. In addition to Baby Shamu, another killer whale bred by Orky and now at Sea World of Texas, is due to give birth within the next few months.

In the Aviculture Dept., significant hatchings over the summer included 22 Scarlet ibis, 13 Sacred ibis, 22 Caribbean flamingos and 28 NeNe geese. *from The Keeper, newsletter of the San Diego AAZK Chapter, of which Sea World is a participating institution.*

Philadelphia Zoo...B&H reported for June-August 1988 include: Mammals - 0.0.2 Geoffroy's marmoset (one of these was our first 2nd generation captive birth for this threatened eastern Brazilian species); 1.0 Indian rhino name "Jimmy" after 35-year keeper James McNellis (this is our 2nd birth and is significant since the sire "Billy" is under-represented in the Indian rhino gene pool); 0.0.2 Senegal galagos. Birds - 0.0.1 White-winged wood duck, 0.0.5 Lilac-breasted roller, 0.0.7 Ruddy duck, 0.0.10 Crested green wood partridge, 0.0.6 Diademed tanager, 0.0.5 Red-billed blue magpie, and 0.0.2 Hermit ibis, continuing the successful breeding program initially launched in the U.S. by our zoo. Reptiles - 0.0.6 Crocodile lizard. *submitted by Robert Berghaier, Philadelphia AAZK Chapter Liaison, Philadelphia, PA.*

Births & Hatchings, *Continued*

Busch Gardens/Tampa...September 1988 B&H include: Mammals - 7.4 Thomson's gazelle, 0.1 Addra gazelle, 0.1 Sitatunga, 1.0 Grant's zebra, 1.1 Greater kudu, 1.0 Uganda kob, 4.2 Impala; Reptiles - 0.0.8 American alligator and 0.0.3 Cottonmouth moccasin; Birds - 0.0.4 Indian peafowl/blue phase, 0.0.1 Green-napped lorikeet, 0.0.4 Blue and gold macaw, 0.0.1 Mexican military macaw, 0.0.2 Blue-streaked lory, 0.0.2 Forsten's lorikeet, 0.0.8 Sun conure, 0.0.4 Lesser Bahama pintail, 0.0.2 Violet-necked lory, 0.0.2 West African crowned crane, 0.0.1 Red-crested touraco, 0.0.3 Jandaya conure, 0.0.6 Scarlet ibis and 0.0.2 Quaker parakeet. *submitted by Mary Eisenacher, Animal Records, Busch Gardens, Tampa, FL.*



Honors & Awards Presented at the AAZPA 1988 Milwaukee Annual Conference

Edward H. Bean Award

Dallas Zoo - Captive Propagation of the Bushmaster
Louisville Zoological Garden - Long-term Captive Propagation of the Common Woolly Monkey

Significant Achievement Awards

Monterey Bay Aquarium - Captive Propagation of the Common Cuttlefish
Monterey Bay Aquarium - Surfperch Breeding Program
Indianapolis Zoo - Captive Propagation of the Cuban Ground Iguana
Houston Zoological Gardens - Captive Propagation of the Golden-headed Quetzal
San Diego Zoo - Captive Propagation of the Chinese Monal
San Diego Zoo - Captive Propagation of the Pygmy Chimpanzee

Exhibit Award

National Zoological Park - Invertebrate Exhibit

Significant Achievement Award

Fort Wayne Children's Zoo - Australian Adventure

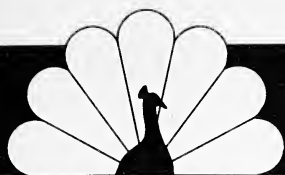
Education Award

National Aquarium in Baltimore - Living in Water

Significant Achievement Awards

Chicago Zoological Park - Connections
New York Zoological Park - Survival Strategies/Project W.I.Z.E.





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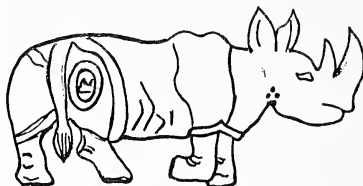
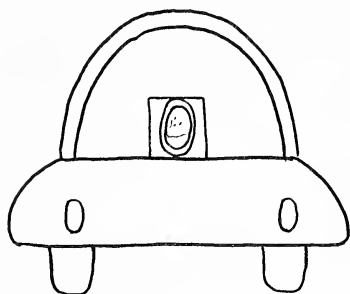
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It's Over?

By
Ed Hansen, Keeper
Reid Park Zoo, Tucson, AZ

When you plot and plan, scrimp and save, beg and plead for over two years to put on a conference that the membership will remember for years to come, it has no right to be over in a couple of hours. I turned my back for a few minutes, and everyone was gone. Where'd you all go?

There are a few chapters who know the feeling of hosting a conference. They know that you are so busy being the host that you only participate in tiny bits of the actual conference. You never get to attend every function and, above all, by the time you're ready to talk about animals, the delegates have all gone home.

Although conference week was a blur, I do have a few memories that I will cherish for at least 10 minutes. The first being on Sunday at the Ice Breaker when, after telling the delegates about sunny, warm Tucson for two years, I looked out the door to see the last thunderstorm of the year dump an inch of rain on 200 or so nicely dressed zoo keepers. Great start. Then Brint Spencer, AAZK Board member, came up to me and shook enough water at me to dilute my beer and informed me that he had to body surf back to his room from the mall. Hey, how do you think we fill all the swimming pools in Arizona? Other than the slide projector falling apart at the guest lecture and nobody dancing to the Bluegrass music, Sunday went fine. Hospitality Suite was rolling, got three hours sleep.

Monday. Screens to set up, projectors to set up, cords to tape, all fine until the projection TV had an electronic episode. The delegate who was to utilize this equipment and had to be rescheduled took it all very well, I just hope that she canceled the hit man contract. Monday evening was the Frank Kohn workshop, the Arthropod workshop and the now-infamous "Roach Contest". Frank was such a good sport, but he'll never believe a word I say from now on. It was also hard to believe the warped creativity that took place at the Roach Contest. Punk roaches, roach motels, etc. (One week after the conference was over, I received a roach in the mail from the Belize Zoo. They had to lift it in with a crane.) Watched tapes in the Hospitality Suite, got two hours sleep.

Tuesday. Easy day, we just put the delegates on the bus, told them to use plenty of sunscreen, and waved bye. The temperature was only about 101 degrees. By the time they got back to the zoo, most were burnt to about medium well. I saw some real ugly hats that day. People had so much sunscreen on that the bus driver said every time he hit the brakes to stop, delegates slid right off the vinyl seats into the aisles.

Zoolympics went great, until I found out they were using my rain gear in the Relay Race, it's now in eight pieces. Dinner, Cantina night, all went fine. The management didn't even mind the animal calls and people dancing on the tables. But I should have known it was not going to stop at 1:00 a.m. The delegates descended on the Hospitality Room like dung beetles, until hotel security closed it down around 3:00 a.m. I had just crawled into bed when hotel security called me to police the pool area. Great. The first thing I saw was a couple people performing high dives that would put Greg Louganis to shame, into the hot tub. After a quieting speech, I talked to someone for two hours (and they know who they are), I then went up to my room to get a good night's sleep, all 45 minutes of it.

Wednesday. Birding trip, 6:00 a.m. I have nothing against birders, I just do not understand why they picked a hobby that makes you have to wake up and shave when it's still dark. The only birds I saw on the trip were on the insides of my eyelids. The trip to the Larson Fabrication Company was great, but I was afraid of the cheese balls, I think they

were fiberglass. It is always fascinating to watch the Silent Auction. We should have played the theme from Rawhide as the keepers herded around the tables bidding \$10.00 on a pair of shoelaces. Amazing. Quiet night, got almost three hours sleep.

Thursday. Papers mean electronic equipment, we don't get along, so I left all morning. Therefore nothing went wrong. I tried to take a nap in the afternoon, but the TV was on and Andy and Barney were catching criminals in Mayberry. I got caught up in all the excitement and couldn't sleep. Banquet. It is strange how you can talk to people all week, but when they put on a dress and/or tie, you don't recognize anybody. The Live Auction is always special, because you can always tell when the bidding reaches the Mastercard limit. Next year along with bid cards, they should pass out towels and smelling salts for use when the delegates finally realizes how much money they just spent. Great band, I almost remember squirming on the floor like a roach with my arms and legs in the air, just because the singer told us to. All of a sudden, everybody was gone, just when I was ready to talk animals. Easy night, wind down, two hours sleep.

Friday. Clean up day. How to remove salsa from the walls of the Hospitality Room to avoid paying the cleaning charge. The hotel staff had never seen 10 cases of beer in a bathtub before. I never saw the buses leave for Phoenix but no one asked for their money back, so I guess they left. Got almost 15 hours of sleep.

Saturday. Bye-bye to the Grand Canyon bus. Relaxed all day then went out to dinner with some Chapter members and some old and new friends. The keepers from Assiniboine Park Zoo who came down for the conference, along with Brint and Susan, are just some of the people who made this conference special for the Tucson Chapter. Bob, Mark and Tim from Winnipeg have been kind enough to let me pick their brains for over a year about conferences, so we took them out on the town for some western hospitality. After consuming some demon alcohol, we then recreated the very first AAZK Conference (see photo below). Thanks guys, you made this a conference no one will forget for a long time.



Re-creation of the very first AAZK Conference by Tucson Chapter members and '88 Conference delegates.

'Fun' Conference Highlights...

The Tucson Chapter hosted many events and functions during the '88 conference, including the 1st ever "Roach Contest", Zoolympics and what has become a tradition, the East vs. West "Tug-of-War".

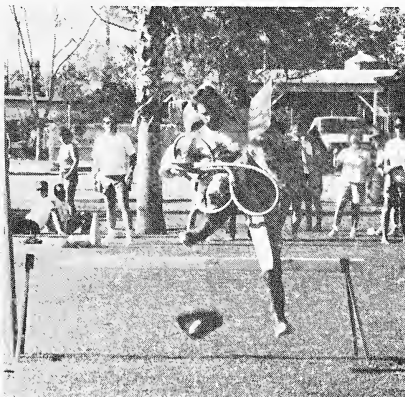
The Monday evening Roach Contest was a major success, with roaches coming across the ocean from as far away as Australia. There were punk roaches and hockey-playing roaches, roaches at the beach and, of course, a roach motel. The largest roach, measuring over 2 1/2 inches was submitted by keepers from the Honolulu Zoo. We never read about those gigantic roaches in all the travel brochures. The grand prize winner was a "roach zoo" (use your imagination), however the members of the Chapter were so amazed by all the costumed roaches, that none of us can remember who submitted the entry, nor did we take any pictures. Creators of the "Roach Zoo", come forward and claim the glory (and submit a picture to *AKE* if you have one). (*Editor's note: the "Fresroach Zoo" was designed and built by keeper Harold Mountan and submitted by the Fresno Zoo AAZK Chapter, Fresno, CA.*)

On Tuesday, after spending most of the day sweating in the Arizona sun, keepers participated in the traditional "Zoolympics": Events held this year were: "The early morning feeding ritual", "Rolling feces rake relay", "Professional skills", and "Zoo Keeper Uncoordination".

The most amazing thing regarding "Zoolympics" is the fact that no one was injured, pride maybe, but not bodies. Winners of the Zoolympics were:

1st Place	2nd Place	3rd Place	4th Place
Ric Urban	Greg Peterson	Dale Frerking	David Thornton
Rusty Harr	Ron Martini	Wayne Sager	Cindi Simpson
Pam McDougall	Gary Frank	Teresa Alderman	Patty Forbes
Mona Keith	Cherie Langlois	Rose Baker	Colleen Kinzley

(I promised Bob Debets and Kelly Webb Fad that I would not mention that they were among the members of the last place team.)



Tulsa Zookeeper Paul Louderback demonstrated that zookeepers can indeed leap tall objects in a single bound during the Tucson '88 Zoolympics.

The "Zoolympics" were followed by the fiercely competitive Tug-of-War. Won last year in Milwaukee by the delegates from the mighty West, they again proved on their home turf that West is Best, beating the East team two straight times. The winning West team will have their names engraved on the Conference Tug-of-War Trophy, donated to AAZK by the Tucson Chapter. The competition moves to the East next year where they will have the home field advantage and the benefit of Frank Kohn not being in a cast.

Again, the Tucson Chapter enjoyed serving as your hosts and we hope that you had a good time in the "Baked Apple". See you next year in Syracuse. Burnet Park -- They're all yours.

Conference '88 Wrap-up...



It seems like just a few months ago that we received the news from Winnipeg that Tucson would be hosts of the 14th National AAZK Conference. Now here it is November of '88 and the Tucson Conference is a fast-fading memory. Time sure flies when you're working like maniacs.

This year's conference was attended by 264 delegates from 88 institutions. They represented 38 states and five countries. They listened to papers ranging from fruit bats to elephants and just about everything inbetween. There were workshops on diets and workshops on bugs, Australasian Rap Sessions and committee meetings that stretched far into the Arizona night.

In every corner of the hotel you would see keepers talking excitedly about their animals and their pet projects. Old friends met once again and new friendships were cast. This year, the conference was held in conjunction with the 8th Annual Conference of Zoological Horticulture and the age-old battle of plants vs. animal raged in both hospitality rooms. Nothing was solved of course.

The Tucson Chapter of the American Association of Zoo Keepers was proud to serve as hosts of the 14th National AAZK Conference. They worked long hours bringing to you a conference that we hope was both enjoyable and educational. I would like to thank them for making my job as Co-chair that much easier.

Jill Hickey
Karen Bongratz
Barbara Palmer
George Montgomery
Leslie Wood
Gale London

Chuck Waters
Timmye Morgan
Kerry Hoffman
Bruce Eneboe
Julie Peyton
Angela Dyson

Rusty Agte
Sara McCalan
Debbie Clutter
Jane Lawson
Bill Martin

So if you did not get a chance to attend the Tucson Conference, make plans right now to attend the '89 conference in Syracuse. Hosted by the Burnet Park AAZK Chapter, it promises to be another memorable conference. The members of the Tucson Chapter look forward to seeing you there -- we'll be the ones that are relaxed and smiling.

Respectively to all members,

Ed Hansen
Co-chair Conference '88



Vitamin E: Facts and Fables

By

*Ellen S. Dierenfeld, Ph.D., Nutritionist
New York Zoological Society
Bronx, NY*

Although vitamin E deficiency has been recognized in captive exotic animals for over four decades (Goss, 1940), more recent widespread diagnoses of deficiency diseases among zoo animals (Liu et al., 1982; 1983; 1984) have prompted recommendations for increased supplementation and much research. Awareness and understanding of this nutrient may help identify and alleviate potential problems.

Vitamin E functions in the body as a biological antioxidant protecting tissues, primarily membranes, against products of metabolism and/or lipid (fat) breakdown. Lack of vitamin E manifests itself differently in various species: primates display anemia or heart disease (Fitch and Dinning, 1963; Liu et al., 1984), hoofstock exhibit muscle and nerve degeneration affecting the heart to the legs to the tongue (Liu et al., 1982; 1983; Dierenfeld and Dolensek, 1988), whereas birds show enlarged hatching muscles and reduced survivability (Liu et al., 1985; Sheppard and Dierenfeld, 1987) and carnivores, inflamed adipose tissues (Nichols et al., 1986) and reproductive impairment.

Vitamin E and the mineral, selenium (Se), are often erroneously considered inseparable and identical in the treatment of these disease states. Se is an integral component of the antioxidant enzyme glutathione peroxidase, which acts to prevent peroxidation of cell membranes through different mechanisms than vitamin E. Because both nutrients serve antioxidant functions, added supplementation of one may spare needs of the other, but both are necessary for proper health and metabolism. In the vast majority of deficiency cases reported in zoo animals, low Se has simply not been the problem. Se is a trace mineral; requirements are < 0.5 mg/kg diet (dry matter basis) whereas vitamin E levels needed by zoo animals are approximately 200 mg/kg diet (dry matter basis). Se levels in feeds depend upon the soil amounts the plants are grown in; NE, NW and SE regions of the United States often contain low to deficient soil Se levels. However, commercial feeds generally contain adequate Se. Given that Se can be quite toxic even at very low dietary levels, supplementation with vitamin E (rather than Se or even a mixture) appears a much more prudent management strategy for zoo animals with suspected deficiency.

Green plants and seeds are relatively good sources of vitamin E, whereas fruits and animal products such as meat or fish generally provide inadequate levels. Drying or processing of cereals depletes vitamin E, thus forages and grains used in captive feeding programs often contain much reduced amounts of vitamin E than the same plant material would if fed fresh. Generally, commercial feeds require additional supplementation to supply adequate vitamin E to animals consuming them. Sometimes this can be supplied at manufacture; other times, external supplementation is indicated.

Although vitamin E is a fat-soluble vitamin, long-term body storage differs from that of vitamins A and D, which accumulate in the liver. Excess vitamins A and D can cause toxicity diseases; the same has not been documented for vitamin E. Vitamin E is stored for short time periods in, but can be rapidly depleted from, the liver. Longer term storage of vitamin E occurs in the adipose tissue. These fat stores, however, are apparently not well utilized by the deficient animal but could potentially supply vitamin E to a secondary consumer (carnivore).

So why are we seeing vitamin E deficiencies now that weren't there before? That probably isn't the case; the problems may have been present in the past, but we just didn't recognize them. More sensitive techniques for measuring vitamin E, combined with more thorough pathology programs in zoos, contributes to our knowledge. But we may also be seeing more total cases: we're keeping animals in collections longer, we're emphasizing accelerated

Vitamin E: Facts and Fables, *Continued*

reproduction programs. Both examples may alter physiological requirements. Past successful diets may simply not be adequate today.

Vitamin E requirements that have been established for most domestic animals are currently under review; it certainly appears that levels for domestic models are inadequate for zoo animals. Stress levels may differ between zoo and domestic species; "stress" increases the need for vitamin E (and other nutrients). Similarly, the trend toward more naturalistic environments may contribute to an increased need for vitamin E -- exercise has been shown to create oxidation products in muscles. Larger exhibits, creating more exercise space, may unintentionally have altered dietary requirements. Finally, increased environmental pollution may play a role in vitamin E (or general biological antioxidant) metabolism and/or needs that didn't exist previously.

Even though it's comparatively easy to provide vitamin E to zoo animals, we still don't know the most effective supplemental forms of this nutrient, exact requirements to fulfill, or fully understand interactions between vitamin E and other nutrients. The problem is multi-faceted and requires further detailed investigation.

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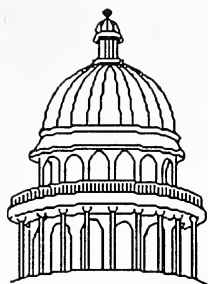
AAZK Announces New Professional Members

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| Adrienne Miller, Roger Williams Prk. Zoo, RI | Lisa Saabye, York's Wild Kingdom (ME) |
| Sheri L. Richards, York's Wild Kingdom (ME) | Fred Utter, W.N.C. Nature Cntr. (NC) |
| Suzanne Crandall, Walt Disney World (FL) | Bruce Holmes, Jacksonville Zoo (FL) |
| Glen A. Grogan, Jacksonville Zoo (FL) | Betty A. Grogan, Jacksonville Zoo (FL) |
| Ethelinda E. Amos, Jacksonville Zoo (FL) | Randy Brockmeyer, Miami Metrozoo (FL) |
| John O. Boner, Indianapolis Zoo (IN) | Bob Thornton, Lincoln Park Zoo (IL) |
| Pete Riger, Riverside Zoo (NE) | Barbara Dowling, Utica Zoo (TX) |
| Brett Baldwin, Abilene Zool. Gdns. (TX) | William Reeder, Los Angeles Zoo (CA) |
| Jane E. Gilbert, San Diego Zoo (CA) | Linda Kinney, Honolulu Zoo (HI) |
| Renee A. Wolfson, Pt. Defiance Zoo (WA) | Marilyn Omlor, Walk in the Wild (WA) |
| Eric Bergeron, Granby Zoo (Quebec) | Sheryl Langan, Driftwood Ranch (Alberta) |
| Glenda Misurelli, Calgary Zoo (Alberta) | Gary McInnis, Valley Zoo (Alberta) |

Legislative Outlook

By

John Stoddard
AAZK Legislative Advisor
Brookfield Zoo, Brookfield, IL



Clean-air legislation dies in Congress

Citing the inability to reach a compromise between the electricity, automobile, coal, and environmental lobbies, the major Senate sponsor of comprehensive clean-air legislation, Sen. George Mitchell (D. Me.), officially declared the legislation dead for this session of Congress. This ends a two year push in Congress to solve one of the nation's most serious environmental problems.

The bill would have introduced new controls on ozone and carbon monoxide in an effort to reduce urban air pollution levels. Also scuttled as a part of the comprehensive package was a plan to reduce emissions from chemical plants and the acid-rain chemicals produced by coal-burning power plants and factories.

> *From Chicago Tribune (5 October 1988)*

U. S. bans tuna imports from four countries

On 13 October the National Oceanic and Atmospheric Administration (NOAA) announced that the U.S. will no longer import yellowfin tuna from the countries of Ecuador, Panama, Venezuela, and the Pacific island nation of Vanuatu. The embargo is a result of those countries' failure to show that their tuna fleets are following rules designed to prevent the accidental killing of dolphins. Last March, as a requirement for importing tuna, the United States began requiring foreign countries to provide evidence that their fishermen make efforts to protect dolphins.

> *From Chicago Tribune (14 October 1988)*

Ocean dumping and incineration bans

Sixty-five member nations of the London Dumping Convention, an international regulatory body that includes the Soviet Union, leading Western nations, and some developing countries, agreed to sharply reduce ocean burning of chemical waste by 1991 and to totally ban the practice by 1994. The six-year phase-in will allow time to develop alternative procedures. Ocean burning is used primarily for wastes that can not be disposed of in other ways with current technology.

Most ocean incineration is carried out by huge incinerator ships in the North Sea, where some 100,000 tons of waste are burned each year. Among the toxic chemicals disposed of by this method is polychlorinated biphenyl (PCB), one of the most toxic chemicals known, and which can produce a lethal gas when burned. Hexachlorophene, another by-product of incineration, is also believed to affect marine life. Potentially hazardous buildups of noxious ash have been found on the bed of the North Sea.

Legislative Update. *Continued*

The ban received much support as a result of the plight of the seals in the North Sea. More than 10,000 seals have died since May in an epidemic that biologists believe may be at least partly due to marine pollution.

In the United States, a House-Senate conference committee agreed on 7 October to ban ocean dumping of sewage sludge after 1991. New York and New Jersey, the only states that still dump in the ocean, dump about 8 million tons of sludge a year in the Atlantic Ocean at a site about 100 miles east of New Jersey. A site just 12 miles offshore was closed by Congress in 1987.

> *From Chicago Tribune (8 October 1988, 9 October 1988)*

Controversy over Animal Welfare Act Amendment implementation

The Animal Welfare Act (AWA), administered by the U.S. Department of Agriculture, is the primary piece of legislation that regulates how captive animals used for biomedical research are housed and treated. Amendments to the AWA enacted on 23 December 1985 outlined improved standards for humane care and use of laboratory animals, but regulations necessary to enforce the amendments have yet to be issued. Without such regulations the amendments cannot be enforced.

One of the most controversial elements of the amendments is the the standard requiring care "adequate to promote the psychological well-being of primates." Scientists and government officials have said that defining and assessing "psychological well-being" in captive primates has been the primary reason for the delay in issuing the regulations. Animal rights groups, on the other hand, believe the government is stalling, at least in part, because of opposition from biomedical researchers. Estimates of the dollar cost to private research facilities to improve primate housing to meet the regulations have ranged as high as \$1 billion or more.

In an attempt to address these concerns, a conference was scheduled for the last week of September at Harvard University. The conference was intended to bring together psychologists, primate specialists, and other scientists to discuss the "psychological well-being" issue.

> *From Chicago Tribune (28 September 1988, Boston Globe article)*

Note: Members are encouraged to become involved in this (and any) legislative issue. For more information try contacting such organizations as the Animal Welfare Institute, the Jane Goodall Institute, the Humane Society of the U.S., or your local humane society. If you would like to urge the USDA to implement the regulations as soon as possible, send your comments to: Hon. Richard Lyng, Secretary of Agriculture, Department of Agriculture, Washington, D.C. 20250.

Rock bands raise money for tropical rain forests

On 24 September the Grateful Dead, Suzanne Vega, Bruce Hornsby and the Range, and Daryl Hall and John Oates gave a benefit concert to raise funds to be used to preserve tropical rain forests. Bob Weir, rhythm guitarist for the Grateful Dead, confirmed the group's commitment to conservation and pledged the group to fighting deforestation in the years to come.

> *From Chicago Tribune (26 September 1988)*



ELECTION.....'89

WE WANT YOU! Do you wish to help your professional organization? Become an AAZK Board Member. Two seats are up for election - those held by Susan Barnard and Brint Spencer, whose terms expire 31 December 1989. New Board Members will serve from 1 January, 1990 through 31 December, 1993. Why is this first call for nominations so early? **TIME** is the answer. Nominations, candidate verification and tallying mailed ballots require time. We also wish to notify winners early enough to allow them to make arrangements to attend the National AAZK Conference **before** they assume office the following January. This will enable the new Board Member to become familiar with Board responsibilities and AAZK activities before they assume responsibility for our organization.

Duties of the Board of Directors

For a more detailed explanation of the expanded duties of the Board, refer to the By-Laws - available upon request from National).

- 1) Select, appoint or remove officers, committees, agents and employees of the Association, including - prescribing powers and duties.
- 2) To control and manage the Association and its property, passing upon acquisition and disbursements with approval of a majority of the Board.
- 3) To formulate policies, rules and regulations in accord with the Constitution & By-Laws.
- 4) To uphold the Constitution of AAZK and the policies of the Association.
- 5) To appear at Board meetings, to accept Board assignments and to devote the time to communications pertinent to all Board business, including answering correspondence promptly and efficiently.

Qualifications for Nomination

- 1) Nominee must be a Professional Member of AAZK and must have been a member of the Association for at least one year.
- 2) Nominee must be presently employed as an animal keeper/attendant by a recognized zoological institution or aquarium in the U.S. or Canada and must have been in the zoological field for at least two years.

Nomination Procedure

- 1) Nominator Form:
 - a. List the name of the nominee, phone, address, and institution.
 - b. State in 150 words or less the reason(s) why the nominee warrants election to the Board.
 - c. Nominator signs forms and mails to NEC Chairperson.
 - d. Notifies nominee that they nominated him/her for the Board.
- 2) Nominee Biographical Form:
 - a. Professional background: places of employment, length of service, titles.
 - b. Membership in AAZK: National and local chapters, number of years, offices held, involvement in activities.
 - c. Educational background.
 - d. Membership in Affiliate Organizations: (AAZPA, Audubon, etc.)
 - e. Other information the nominee feels is pertinent.
 - f. References (one or two)
 - g. Nominee signs forms and mails to NEC Chairperson.

NOTE: Candidate is ineligible for nomination if **both** the nominator and nominee biographical **forms** are not **complete** and **returned** to the NEC Chairperson by **31 January 1989**. Forms are in this issue of **AKF** or may be obtained from the NEC Chairman. Send completed forms to: Rachel Rogers, METROZOO, 12400 S.W. 152 St., Miami, FL 33177.

Nominator Form for
AAZK Board of Directors

Qualifications for Nomination:

- 1) Nominee must be a Professional Member of AAZK and must have been a member of the Association for at least one year.
- 2) Nominee must be presently employed as an animal keeper/attendant by a recognized zoological institution or aquarium in the U.S. or Canada and must have been in the zoological field for at least two years.

1. Name of Nominee _____

Address: _____

Phone: _____

Institution: _____

2. State in 150 words or less the reason(s) why the nominee warrants election to the AAZK Board of Directors.

3. Signature of Nominator: _____

4. Form must be received by the NEC Chairperson by 31 January 1989. Send to: Rachel Rogers, NEC Chair, METROZOO, 12400 152 St., Miami, FL 33177.

Nominee Biographical Form for AAZK Board of Directors

1. Name _____

Address: _____

Phone: _____

PLEASE LIST THE FOLLOWING INFORMATION;

2. Professional Background: (places of employment, length of service, titles)

3. Membership in AAZK:

a) National: number of years _____

Activities:

b) Local Chapter(s): number of years, offices held, involvement in activities.

4. Educational Background:

Nominee Biographical Form/AAZK Board of Directors, *Continued*

5. Memberships in Affiliate Organizations: (AAZPA, Audubon, etc.)

6. Other information the nominee feels to be pertinent.

7. References (one or two): give name, address and phone number where they can be reached.

8. Nominee's Signature: _____

9. Form must be received by NEC Chair by 31 January 1989. Send form to: Rachel Rogers, NEC Chair, METROZOO, 12400 152 St., Miami, FL 33177.

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*I certify that the statements made by
 me above are correct and complete.*

Signature and Title of Editor

Susan D. Chan
 Editor-in-Chief



Successful Propagation of Blue-Crowned Motmots

By
Bernie Feldman, Keeper
Burnet Park Zoo, Syracuse, NY

One of the most exciting aspects in the zookeeping profession is to witness the unfolding of an animal's captive natural history. This was observed when a pair of Blue-crowned Motmots (*Motmotus momota*) dug several burrows, incubated eggs and successfully reared four chicks in the spring and summer of 1987, in an aviary exhibit called the 'Diversity of Birds' at the Burnet Park Zoo, Syracuse, NY.

Sharing the aviary exhibit with this breeding pair of Blue-crowned motmots were: one non-breeding pair of Blue-crowned motmots, one pair of Golden Tanagers (*Tangara arthus*), one female Silver-throated Tanager (*Tangara icteracephala*), one male Eastern Bluebird (*Sialia sialis*), one male Evening Grosbeak (*Coccothraustes vespertinus*), one pair of Red-crested Cardinals (*Paroaria coronata*), four Ringed Teal (*Callonetta leucophrys*), six Scarlet Ibis (*Eudocimus ruber*), one male Guianan Cock-of-the-Rock (*Rupicola rupicola*), one pair of Red and White Crakes (*Laterallus leucopyrrhus*), one pair of Small-billed Tinamou (*Crypturellus parvirostris*), and a variety of shorebirds. The exhibit itself has many tropical plants, two pools and enough area to include the above species without undue competition or predation especially during the breeding season.

Diggings began in the autumn months of September and October 1986, in the loamy soil of the 'Diversity of Birds' exhibit. Several digging sites of the Motmots were started and eventually abandoned. Both male and female birds dug tunnels with the male doing the major part of the digging. Eventually one digging site through the rootmass of a Weeping Fig tree (*Ficus benjamina*) proved acceptable to them. After developing a mouth of the burrow 24" wide and 15' high, smaller holes were started inside the rim of the upper portion of this large burrow (See Diagram #1). One smaller hole, approximately 5" in diameter and in three inches of soil was to become the opening of the actual tunnel of the motmot nest. This resembled what Skutch (1983) described "...it appeared to be the old den of some burrowing animal." It is interesting to note that the motmot burrow was relatively easy to view and not concealed as reported by Orejuela (1977) where he reported the nests were well-concealed by vegetation. However, the effect of the smaller burrow entrance off of the larger digging site helped conceal the entrance (Reininger, 1988).

There appeared to be reduced activity around the burrow in November-December 1986, and January 1987 from earlier months. Digging restarted in mid-February 1987 as was evidenced by a large growing mound of dirt at the entrance of the burrow.

Copulation was observed with much vocalizing in late April 1987. It lasted five to ten seconds. During this period of time their defense of the territory close to the entrance of the burrow intensified. This was observed by the larger expenditure of time spent in this area, the active displacement of the non-breeding pair of Blue-crowned motmots and any other species of bird that came close to the entrance of the burrow or perched in the fig tree over the burrow.

Prior to this point in time of 1987, four adult Blue-crowned motmots were living relatively peacefully with other avian species in our Diversity exhibit. Eventually, however, the breeding pair of Blue-crowned motmots defended their territory from the non-breeding pair so aggressively that the non-breeding pair was removed from the exhibit in May 1987 to an adjoining exhibit where auditory and visual contact was possible. The aggressive behavior of the breeding pair of motmots tapered off.

Occasionally the male was observed bringing food to the female, re-enforcing their bond. Vocalizations increased during this time. Their call of "oot-goot" repeatedly in a

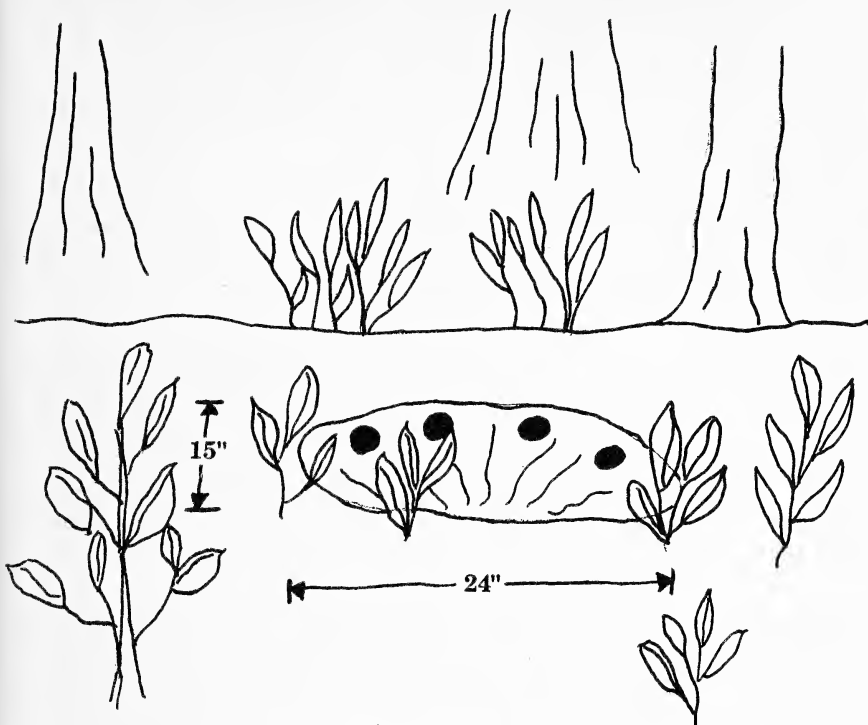


Diagram #1

whispered, almost ghostly nature, characterized the vocalizations. While the birds are calling to each other there is much tail-twitching suggesting the swinging pendulum of a clock. When the birds are agitated the tail-twitching is done in a more pronounced fashion with the first tail twitch being raised and then the pendulum swinging. In late April-early May 1987, this pair started to disappear for lengths of time during the day. Eventually the male was never observed until afternoon. At that point it was assumed incubation of a clutch of eggs had started. The female then assumed incubation duties soon after the male came out of the burrow, and remained in the burrow for the rest of the day and night. This was assumed by her absence. The female was assumed to be relieved by the male in the early morning since she was always on exhibit in the morning. Alexander Skutch (1983) explains motmot replacements at the nest to occur in the dim light of dawn and a short time after noon. The birds supposedly then "relieved each other only twice each day, which reduced movement at the burrow to a minimum."

In late May 1987, approximately twenty-eight days after the pair started alternately disappearing into the burrow, the male was observed out of the burrow in the morning for the first time. During the incubation period, he had been observed only in the afternoon. The female was also alternately observable during this time. This was an indication that the chicks had most likely hatched. The male had what appeared to be a piece of meat in his beak. At this point several mealworms were offered near the entrance of the burrow. Both parents immediately began taking the mealworms into the burrow every two to five minutes.

Successful Propagation of Blue-crowned Motmots, Continued

The diet of the Diversity exhibit at this time was offered once in the morning and again in the afternoon. It consisted of a meat mix which is three parts Bird of Prey diet by Nebraska Brand®, and three parts Country Game and Turkey Breeder Chow by Agway®. The fruit mix is a finely chopped mixture of a large variety of fruits. Orange slices, finch seeds, wild bird seeds, Country Game and Turkey Breeder Chow, sunflower seeds, and mealworms were also offered. Avia®, a vitamin supplement and grit were sprinkled on the diets daily. Roxanthin-Red 10® was sprinkled on the diet on Mondays, Wednesdays, and Fridays.

Mealworms, earthworms, chilled crickets and chopped pinkie mice were offered in addition to the usual diet in both the three diet pans and a temporary pan placed close to the burrow entrance. The additional mealworms, earthworms, chilled crickets and pinkie mice were offered upwards to six times daily. On the tenth day following the assumed hatching date, the temporary pan was removed from the proximity of the burrow entrance and placed within a rotting stump approximately ten feet visible from the burrow entrance. This temporary diet pan was the primary food target of the motmots for their chicks. On an average day the temporary diet pan received approximately 75 chilled crickets, 90-100 mealworms, seven to ten earthworms, and three to five chopped pinkie mice. The parent birds fed the chicks these food items very well. Soon it became apparent that stunned or chilled crickets were the favored food items. At two weeks following the assumed hatching date, the motmots were observed taking meat mix into the burrow for the first time. The male bird was also observed to be the more active feeder than the female. Feeding preferences seemed to be crickets and mealworms. Also at approximately two weeks following the assumed hatching date, the sounds of the chicks were heard via a stethoscope placed on the ground just inside the mouth of the burrow.

On approximately Day 20 or 21 post-assumed hatching, the parent motmots would enter the burrow just more than a body length, feed the chicks then back out of the burrow. This was ascertained when the tips of their tails remained just visible at the mouth of the burrow.

On Day 29 to 30, using a flashlight, one of the motmot chicks was observed inside the burrow. Up to this point no chicks had been observed. Five days earlier on Day 24 to 25, chick vocalizations inside the burrow were recorded on a reel-to-reel tape recorder. Prehistoric-like sounds were heard. Through these recordings, which included one or two feedings by the parent birds, it was decided that there were at least two chicks and maybe more in the burrow.

On Day 31-32, two chicks emerged from the burrow in the morning and two more chicks in the afternoon. All of the fledglings experienced difficulty perching on any branch or perching possibility. They appeared to be soft, weak fliers. The subterranean existence of the motmots for the first 30-32 days afforded no toe or wing exercise and consequently the chicks experienced perching difficulties and were not fast and undulating fliers as were the parent birds. Soon the four chicks spent most of their daytime existence in the fig tree fairly close to the burrow. Since their fledging, the motmot chicks never returned to the burrow. Both parent birds attended to the chicks very diligently with the male parent being the dominant feeder.

The few days following fledging, the parent motmots were observed feeding the chicks Norfolk Island Pine needles (*Araucaria excelsa*). This was soon corrected when the supplemental diet of mealworms, crickets, and earthworms was increased. The chicks readily accepted the pine needles, swallowing them and eventually throwing them out of their beaks. Occasionally the motmots were observed regurgitating a pellet of indigestible food items. Close examination of them proved to be basically hard plant parts which sometimes included Norfolk Island Pine needles.

At this time it was also noted that the standard meat mix was not readily taken. Occasionally live crickets were broadcast around the abandoned burrow. At this point the crickets were always actively hunted by the motmots. Soon the chicks were observed to be actively foraging throughout the day. This activity was noted approximately at Day 40, post-assumed hatching. During this time the parent birds continued to offer food items which were always accepted by the chicks.

Successful Propagation of Blue-crowned Motmots, *Continued*

The chick's racquet-tipped tail feathers began to be noticed when the period of active foraging started. The chicks presumably were plucking the barbs of their own tail feathers. In a few days the chicks dispersed throughout the exhibit and no begging behavior of the chicks was observed though some feeding of the chicks by the parents was observed. This is noted at approximately Day 48, post-assumed hatching. At this point the supplemental feedings were being decreased as a transition from the supplemental diet to the standard diet was desired and eventually accomplished. Approximately seven and one half weeks following the assumed hatching date, the diet of the Diversity exhibit returned to normal.

After the dispersal of the motmot chicks throughout the Diversity exhibit, the burrow and nesting chamber were exhumed and examined. The mouth of the large burrow in which the beginning of the motmot tunnel was discovered was approximately 24" wide and 10" in height. The entrance of the motmot tunnel was located in the upper left portion of the mouth of the large burrow and had a diameter of 5". It was 3" from the surface of the soil. The motmot tunnel coursed eighteen inches in a straight line and gently descended to a depth of seven inches. At this point the tunnel branches. The branch angled right at a forty-five degree angle and then continued for another ten inches. This angled tunnel constituted a false nesting chamber since it showed no evidence of past activity. The straight tunnel continued for another eight inches where it terminated. The end of the straight tunnel also angled right at a forty-five degree angle and continued for sixteen to eighteen inches. At the end of this particular chamber the nest proper widens to a diameter of ten inches. The depth of this nest from the surface was approximately ten inches. Throughout the entire tunnel and its adjoining branches and chambers there was no evidence of fecal matter or nesting material (See Diagram #2).

As of this writing, June 1988, the parent birds have re-nested in the same general vicinity of the 1987 nest. The 1987 chicks were shipped to other facilities. Numerous volunteers have generously given of their time for a more detailed study of feeding and fledging behavior of these interesting birds.



Blue-crowned Motmot

(Motmotus momota)

Motmot Burrow

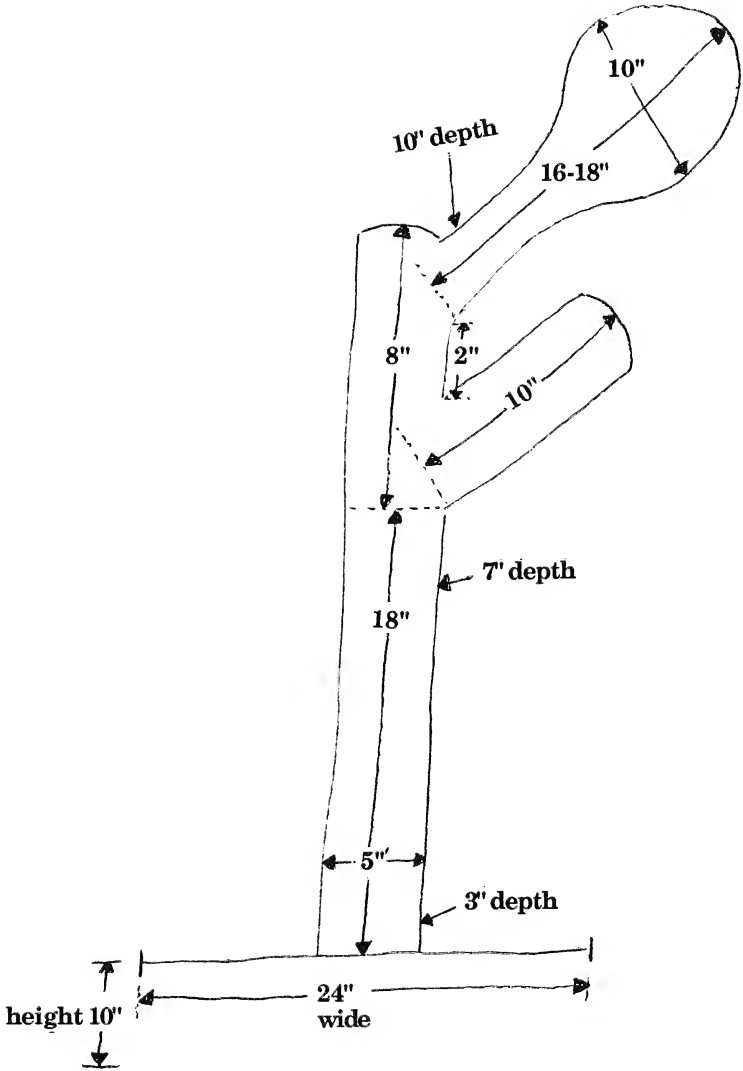


Diagram #2

Successful Propagation of Blue-crowned Motmots. *Continued*

Literature Cited

- Orejuela, L.E. 1977. Comparative Biology of Turquoise-browed and Blue-crowned Motmots in the Yucatan Peninsula, Mexico. pp. 193-208. IN D.A. Lancaster (Ed.), The Living Bird. The Laboratory of Ornithology, Cornell University Press, Ithaca, NY.
- Skutch, A.F. 1983. Birds of Tropical America. pp. 199-211. University of Texas Press, Austin, TX.

Products Mentioned in the Text

- Nebraska Brand® Bird of Prey Diet, distributed by Animal Spectrum, Inc., P.O. Box 6307, Lincoln, NE 68506-0307.
- Country Game and Turkey Breeder Chow®, product of Agway, Inc., P.O. Box 4751, Syracuse, NY 13221.
- Soft billed Bird-Fare®, Reliable Protein Products, 3960 Laurel Canyon, Suite 447, Studio City, CA 91604.
- Avia®, Nurta Vet Research Corp., 201 Smith St., Poughkeepsie, NY 12601.
- Roxanthin Red-10®, made by Hoffman-LaRoche, distributed by Nutritional Research Association, Inc., Box 354, 407 E. Broad St., South Whitley, IN 46789.

Other Sources Cited

- Reininger, K.T., Personal communication, Curator of Birds and Reptiles, Burnet Park Zoo, Syracuse, NY



Chapter News

Bronx Zoo AAZK Chapter

For all the members of our Chapter who couldn't attend the AAZK National Conference in Tucson, Frank Leonard, Senior Wild Animal Keeper, showed us highlights of the conference, the environs, and the pre- and post-conference trips. His photographs were beautiful, especially the ones of the cacti, and his commentary was both informative and entertaining. Flo Klecha, Wild Animal Keeper, gave the paper she presented on Sea Lion Propagation at the New York Zoological Park. We were very proud of her. These two presentations took place at our 3 October meeting.

Awards from the national AAZK were presented to Marty Zybura and Anthony Brownie for excellence in journalism for their paper on Snow Leopards. And our Conservation Biologist, Dr. Michael Hutchins, was

cited for his part in developing the workshop "Applying Behavioral Research to Zoo Animal Management" for which the Woodland Park Zoo won an award.

Our Chapter received a certificate of protection for the first four acres of rainforest in Belize that we have preserved with the profits from selling our logo patch. Thanks also to all of you who bought our patches at the conference. That will help buy the next four acres!

--Wendy Worth
Corresponding Secretary

Philadelphia Zoo AAZK Chapter

This year we began "Keeping up with Keepers" a program in which society members paid to spend a hour working with a keeper. We will now do this twice a year and funds go back into the Chapter. We are continuing Keeper Evenings three times per year in which members come to the zoo after hours and get to hear inside

Chapter News. *Continued*

stories of keepers and animals. This program is also a Chapter fundraiser and both programs have been sell-outs.

Our Chapter also participated in the Zoo's Conservation Day by giving mini-talks and distributing information on the endangered species found at our facility. The Chapter also designed and funded the creation of graphics highlighting the endangered status of three species in our collection.

The Chapter is presently working with Wildlife Preservation Trust International and the Philadelphia Zoo to help create a training video for zoos in Third World countries. Andy Lodge from the Columbus Zoo, who is also the coordinator for the Negare Sergoi Support Group, was invited as a guest speaker and did an excellent job with his presentation on the critical status of the black rhino population in Kenya.

*--Robert Berghaier
Chapter Liaison*

Chapters are reminded to send information for the Chapter News column by the 15th of each month. Include new officers, projects, etc.

San Diego AAZK Chapter

In September the Chapter participated in a behind-the-scenes tour of Sea World. Their hosts provided a meal of homemade tacos and a fantastic tour which included close-up looks at rare seals and dolphins, whales and baby porpoises, exotic birds and the facility's animal care center. Included as a highlight of the tour was the opportunity to handle a hand-raised Humboldt's penguin and "play" in the ice with fledgling emperor and king penguin chicks.

In October the Chapter's program was on "Insects of the African Sub-continent" presented by David Faulkner, Natural History Museum entomologist.

The Chapter is in the process of selling their remaining inventory of AAZK logo brass belt buckles. They have decided to discontinue the project and are seeking another chapter which might be interested in taking it on as a fundraiser. Anyone interested should contact Terri Schuerman at the San Diego Wild Animal Park Wildlife Workshop.

*--The Keeper Newsletter
October 1988*



Must Zoo Remain Irrelevant?

By

Peter Stroud, Carnivore Keeper
Adelaide Zoo
Australia

(Editor's note: The following is reprinted from Thylacinus, the journal of the Australasian Society of Zoo Keepers, Vol. 11, No. 1, 1986. Although it references Australian zoos, the overall message is universal.)

"Minimizing habitat destruction is the key, because virtually every area has unique populations whose disappearance contributes to the earth's biological impoverishment. The crucial battles of the conservation movement, then, will not be fought over Gorillas, or Whales or Leopards, or Snail Darters. They will be fought like most military battles, over pieces of terrain - of Habitat. Only by saving habitat can most species and populations be preserved in the long run." [Ehrlich and Erlich, 1981].

"I recognize that the majority of people come for an experience and to enjoy themselves and quite rightly so, but we hope they take away a greater understanding of the importance of conservation. In the final analysis, unless we can do that we are wasting our time." [Mallinson, 1984].

Early last year a member of the Council of the Royal Zoological Society of South Australia stated that the only reason the Council was even considering building a new Reptile House at the Adelaide Zoo was to bring more money through the gates. Some of us were dismayed, to say the least, by this attitude, especially considering the age and experience of the Council in zoo matters.

We were further concerned on hearing of the Council's plan to create a position of Administrator as the most senior post in the Zoo, to be filled in all likelihood, we were told, by an "entrepreneurial business person". Fortunately, the Zoo staff reacted, along with many ordinary members of the Zoological Society, the public and the media, to oppose the basic principle of this idea. After Government intervention, the plan was scrapped (We now have a newly constituted Board of Governors).

These events led me to consider how effective Australian zoos may be as forces for conservation, particularly through their approach to the average adult visitor. Unfortunately, there is surprisingly little information available to the ordinary zoo keeper about the detailed workings of respective Australian zoos. I have therefore taken the two zoos I know best, Melbourne and Adelaide, as representatives of the spectrum. If this is mistaken then I hope that some of the following points still remain relevant and constructive.

If I go to Adelaide or Melbourne Zoo as a visitor rather than as an employee, and if I seek no guided tour (there are as yet none at Adelaide anyway) and do not buy a guide book, then I will find almost no reason anywhere, stated or implied, for the existence of the animal collection I am viewing. Indeed, I may find nothing more than the animals' names on many exhibits. Yet, I will see some beautiful exhibits, or so I may think, and some ugly ones. I may be told that some exhibits, though still occupied, are old and out of date (though such candor is yet to be found at Adelaide). I will be offered the spectacle of

VIEWPOINT: Must Zoos Remain Irrelevant?, *Continued*

animals feeding at set times, the possibility of a train ride or fun-fair, souvenirs (often in dubious taste), etc., etc. In short, I will be entertained. It could seem that zoos are still designed first and foremost to appeal to me in a fairly superficial way and I might leave with the same casual regard for animals and conservation that I entered with. Amused certainly, sympathetic maybe, but uninformed probably. If this is so, then I would contend that these zoos are failing.

We rightly perceive a need to entertain, but allow this to lead us into areas of quite questionable practice where, far from educating the visiting public, we often reinforce wrong-headed ideas and prejudices, placing an accent on the cute and 'human characteristics of animals'. Hand-in-hand with this goes an unwillingness to show the public anything they might feel is unpleasant or unacceptable, even if it is entirely natural. To attract money we must "look good". At its worst this approach leads to the acquisition of animals whose needs cannot be properly fulfilled, simply because the public expects to see them. It is tragic that some endangered species now seem to fall into this category.

Many visitors probably now have a dawning awareness that zoos have something to do with saving rare animals. Indeed, involvement in this field has rightly become a badge of respectability for many zoos. But one could also be forgiven for thinking that this has become something of a band-wagon. The Adelaide Zoo has acquired several species in recent years, including Indian Lions and Siberian Tigers, which cannot be allowed to breed because there is no market for their offspring and which are kept in less than optimum conditions. Yet, there have been successes with other species but the point stands, these animals should probably never have been acquired.

Bluntly, our role as conservators is often compromised, rather than helped, by a perceived need to 'appeal'. We take what we think is a short-cut to financial gain, even though it may undermine our true objectives--we promote care, at best, but not much understanding.

Zoos are probably the only institutions remotely connected with the conservation of nature that most people have any connection with. The potential to reach large numbers of people on conservation issues is therefore enormous. There is an inherent appeal about animals that does not rest merely on the cute and cuddly. This can easily be utilized without resorting to any kind of circus mentality.

I do not believe there need be any adverse financial fall-out from the clearly stated and observed dictum that the animals come first in all things. Furthermore, I believe this declared and conveyed primary concern for the animal in conjunction with the continual emphasis on the relationship between animals and habitat can become a level of public consciousness about habitat. 'Habitat is all'. Zoos must adopt a broader view about how they can contribute towards conservation. It would be ridiculous to suggest that zoos cannot contribute to the preservation of species through captive breeding. They can and must. But there should be no doubt about our capabilities in this area. We cannot possibly save more than a fraction of the number of species which are likely to be threatened with extinction in the near future, even with the best allocation of growing resources. And of course problems are compounded by the need to maintain genetic diversity within species and to maintain wild strains as opposed to those 'adapted' to confinement. Realizing this is an essential step towards educating the public about the real needs of wildlife. It would be ironic indeed if, through 'self congratulatory' statements about our very limited successes as conservators, we were to leave the public with the impression that conservation could be left to zoos - "we're alright, let zoos take care of it". A real honesty about our sadly limited capabilities and the ultimately unsatisfactory nature of captive breeding as a **'be all and end all'** strategy for conservation is called for. We must stress that while animals can be perfectly 'content' in captivity if their requirements are met, saving **species** from extinction this way is a matter of last resort. Again, "Habitat is all". Graphics, hand-outs, publicity and 'events' should continuously convey these ideas.

VIEWPOINT: Must Zoos Remain Irrelevant? *Continued*

It is often said of graphics that "the public doesn't read them anyway". I would contend that the public does read **bad** graphics. Advertising techniques should be employed in designing graphics that directly convey simple ideas and perhaps more importantly, raise questions. Graphics should not be seen only as a means of imparting slabs of information. That is not to say that more complex information should not be available - in fact if questions are raised, answers will be sought.

It is not enough to simply exhibit an animal. Interpretation is all. Zoos must become not just windows on the world's diversity of animal life, but windows on what is happening to that diversity and what must be done to save it. This does not require major change or great expenditure and such emphasis would quickly tie zoos more closely to the mainstream of the conservation movement. Closer relationships could be further helped by including conservation groups to place displays and publicity material within zoos. Every zoo should have an 'information wall' and if this seems 'politically' dangerous, then allow information to be balanced by opposing points of view, where they may be valid. By such means zoos may contribute to the conservation of nature by helping to reach that mass of the public who do not take guided tours, who buy a guide book only for the map and the photographs, who regard the zoo as just a place for kids.

It is perhaps difficult to determine (let alone achieve) set goals where public awareness is concerned, yet this must be done. Responses must be measured to ensure that means employed to educate the zoo visitor are effective just as it is important to determine whether the visitor 'enjoyed' his or her visit. Visitor surveys must be made, feelings and opinions recorded, awareness tested. At the moment the Adelaide Zoo does not even have a 'Visitors Book' and I doubt that other Australian zoos do either.

I suppose I am advocating a more aggressive role for zoos as conservators/educators. There are of course some problems associated with adopting such a role. Zoos are necessarily heavily dependent on 'outside' funding as noncommercial entities. State and establishment bodies are often the very forces diametrically opposed to meaningful long-term conservation strategies that might ensure the survival of wildlife. Positions on the governing bodies of zoos have often, in the past, been filled by 'pillars of the establishment' or simply the 'ill-informed', people not inclined to support 'radical conservation' and happier living with hazier ideas about zoos and their roles as 'Cultural Institutions' - a steady as she goes approach. Too often stagnation has been seen as stability and small measures taken where larger ones were called for.

And keepers, of course, are 'on tap' and rarely 'on top'. While they may contribute directly to the quality of life of the animals under their care, they have little responsibility for the tenor of a zoo.

But if all concerned with zoos can only see that the best and most effective role of zoos in the conservation of biological diversity rests not simply in the breeding of endangered species, but also in the effective education of the public about the real needs of animals in captivity and in the wild, then zoos can become not just reactive organizations, picking up the pieces, but forces for positive change. We haven't yet reached the stage where we are scrambling madly to save the last handful of species left on earth. However, nothing we could do would bring such a situation about more quickly, or betray the broader conservation movement more seriously, than to assume the public are a lost cause, that we must humor them and take their money.

The global conservation movement has been fighting what are essentially rearguard actions. Only effective education of the public in how zoos can play a role will change this situation short of some greivous environmental crisis of a sort many already predict, and then it may be too late.

If zoos take a narrow view about their role in education/conservation, they may save a very few species from extinction but will otherwise **remain** largely irrelevant.

VIEWPOINT: Must Zoos Remain Irrelevant?, Continued

References

- Ehrlich, P. and A. Ehrlich (1981) *Extinctions, The Causes and Consequences of the Disappearance of Species*, Ballantine Books, Random House Inc., New York.
- Mallinson, J. (1984) *The First Twenty Five Years, The Jersey Zoo*. Jersey Evening Post, Souvenir Publication, Jersey, Channel Islands, U.K.



Have any good photos? The AAZK Public Education Committee is looking for photo contributions to be used in the "Zookeeping As A Career" poster project. Photo submitted should show keepers working in the areas of Animal Care, Research, Conservation and Education. We need color photographs in 5" x 7" or 8" x 10" size, or send a negative with your regular size photo. Send photos to: Tom LaBarge, c/o Burnet Park Zoo, 500 Burnet Park Drive, Syracuse, NY 13204.

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PINS AND CHARMS: Enameled three-quarter inch pins and charms with the official AAZK logo are done in the same colors as the AAZK patch. The charms are suitable for necklaces. Price per pin or charm is **\$3.50**.

PATCHES: AAZK Patches are available for **\$3.00** each.

CONFERENCE PROCEEDINGS: The following issues available at the prices listed.

1981 Fresno National Conference	\$2.00
1983 Philadelphia National Conference	\$2.00
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1985 Miami National Conference	\$3.50
1986 Winnipeg National Conference	\$4.00
1987 Milwaukee National Conference	\$7.00

81,83,84,85,86,87 National Conference Proceedings Package \$15.00

Above Items Available PREPAID ONLY

INDIVIDUAL BACK ISSUES OF ANIMAL KEEPERS' FORUM (if available) \$2.00 per issue. Contact The Editor with requests for specific issues.

ZOOKEEPING AS A CAREER BROCHURES: \$10.00 per 100 plus postage. Send requests to National Headquarters and you will be billed for brochures and postage. (For a single copy, send to self-addressed, stamped, legal-sized envelope.)

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Co-Directors of Regional Coordinator System

States East of Mississippi - Diane Krug, Rt. 1, Box 273, Hilliard, FL 32046 (904) 225-9559 [work]
(904) 845-4279 [home]

States West of Mississippi - Debbera Stecher, Woodland Park Zoo, 5500 Phinney Ave., North, Seattle, WA
98103. (206) 625-5402 [work] (206) 745-8198 [home]

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Bill Whittaker, Toledo Zoological Gardens, Toledo, OH 43609
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for the states of WI, IL, MO, MN, and IA

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for the states of OK, NE, KS, ND, and SD

Elandra Aum, Woodland Park Zoo, 5500 Phinney Ave. N., Seattle, WA 98103 [206] 625-2244 [w]
for the states of WA, OR, ID, MT, WY and AK

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for the Province of Manitoba, Canada (204) 489-3893 [h]

Marcia Rasmussen, Calgary Zoo, P.O. Box 3036, Stn. B., Calgary, Alberta, Canada T2M 4R8
for the Provinces of Alberta and British Columbia, Canada (403) 235- 5461 [h]

AAZK would like to announce the following new RCs: Elandra Aum for the states of WA,OR,ID,MT,WA and AK; Colleen Kinzley for the states of WI,IL,MO,MN and IA; and John Branagan for the states of PA,DE,NJ,MD and Washington, DC. Also please note a change of address for Vivki Bohnert, RC for the state of Florida. Vacancies still exist for [1] the states of LA and MS and [2] the states of ME,VT,NH,MA,RI and CT. If you are interested in either of these RC positions, please contact one of the RC Co-Directors for more information.

Until the vacancies are filled, those who have questions should contact the following individuals who are temporarily covering the states with vacancies: Tim Kurkowski, Zoo Atlanta, for the States LA and MS; and Chris Garland, North Carolina Zoo, for the States of ME, VT,NH,MA,RI and CT.

Need membership information? Want to learn more about AAZK or start a Chapter or become more active - then call your RC! They will be glad to assist you with any information you need about AAZK.



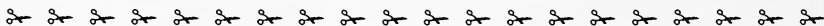
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The Diet Notebook is a copyrighted publication of the American Association of Zoo Keepers, Inc., and may be ordered by filling out the following form and sending it, along with a check or money order (U.S. FUNDS ONLY) made payable to "AAZK Diet Notebook" to: Diet Notebook Order, AAZK, 635 Gage Blvd., Topeka, KS 66606 U.S.A.

Cost of the Diet Notebook is as follows: 1) AAZK Members \$40.00; 2) Non-members \$55.00; 3) Institutions \$70.00. These prices represent prepaid order prices and include postage for the U.S. and Canada. Those placing orders from overseas should contact AAZK Administrative Offices, 635 Gage Blvd., Topeka, KS 66606 for additional postage charges. Please allow 4-6 weeks for delivery.



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Institutions wishing to advertise employment opportunities are asked to send pertinent data by the 15th of each month to: Opportunity Knocks/ΔΚΕ, 635 Gage Blvd., Topeka, KS 66606. Please include closing dates for positions available. There is no charge for this service and phone-in listings of positions which become available close to deadline are accepted.

ELEPHANT HANDLER...requires experience and good references. Will participate in elephant breeding and husbandry program as well as elephant training demonstrations. Send resume by **15 December 1988** to: Charlie Gray, Elephant Barn, African Lion Safari, RR# 1, Cambridge, Ontario, N1R 5S2, Canada. Phone: (519) 740-0364.

ZOOKEEPER...draft horse driving and husbandry experience required. Minimum two years. Salary commensurate with experience. Resume to: Richard M. Hurst, Director of Human Resources, Indianapolis Zoo, 1200 W. Washington St., Indianapolis, IN 46222 by **30 November 1988**.

EDUCATION CURATOR...requires Bachelor's degree in education, with emphasis in general sciences or related field and three years of teaching experience. Responsible for management of a diversified education department. Will coordinate daily operations of education department as well as develop ongoing expansion of programs. Salary range \$16,000 to \$19,000. Send letter and resume by **15 December 1988** to: John Chapo, Director, Folsom Children's Zoo & Botanical Gardens, 2800 A Street, Lincoln, NE 68502.

ZOO ANIMAL REGISTRAR...requires education and experience equivalent to two years of college in zoology, biology, one year experience as a zoo registrar in a full service zoo, and 30 typing wpm speed. Will maintain a record-keeping system to account for the status of all animals; responsible for maintaining permits, arranging animal transportation, various office duties. Salary \$1839-\$2234/mo. plus excellent benefits. Apply by **30 November 1988**. Call (714) 647-5340 for required application form. City of Santa Ana, 20 Civic Center Plaza, Santa Ana, CA 92701.

SENIOR KEEPER...requires four years' experience, degree in zoology or related field, additional experience may substitute for degree. Good communication and training skills are also required. Experience with elephants and hoofed stock desirable. This is a working supervisory position. Salary \$18,000-\$20,000 plus benefits. DOE.

KEEPERS (five positions open)...requires two years' experience or degree in zoology or related field and one years' experience working with mammals (4 positions) or birds (1 position), limited reptile collection. Knowledge of husbandry, exhibition of animals, animal behavior, data gathering and reporting and good communication skills are also required. Salary \$15,000-\$16,000 plus benefits. DOE.

All positions available 1 January 1989. Send cover letter, resume and references by **1 December 1988** to: Ron Glazier, Executive Director, Racine Zoological Society, 2131 N. Main St., Racine, WI 53402 (414) 636-9291. EOE.



Information Please

I am currently looking for any information on lemurs, especially brown (*Lemur macaco fulvus*), ring-tailed (*Lemur catta catta*) and black and white ruffed (*Lemur variegatus variegatus*). Any information pertaining to housing and reproduction would be greatly appreciated. Please send to: Carla Wieser, c/o Henry Doorly Zoo, 3701 S. 10th St., Omaha, NE 68107-2200.

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Name _____ Check here if renewal []

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_____ \$50.00 Contributing
Organizations and
Individuals

Directory Information: Zoo: _____

Work Area: _____ **Special Interests:** _____

Mail this application and check or money order (U.S. CURRENCY ONLY PLEASE), payable to American Association of Zoo Keepers, Inc., to: AAZK National Headquarters, Topeka Zoo, 635 Gage Blvd., Topeka, KS 66606.

Membership includes a subscription to 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 for consideration.

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 no more than 6" x 10" (15cm x 25 1/2cm). Literature used should be cited in the text and in final bibliography. Avoid footnotes. Include scientific name of species the first time it is used. Thereafter use common name. Black and white photos only accepted.

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. Telephone 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 Ext. 31.

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

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Animal Keepers' Forum

December 1988
Special Edition



American Assoc.
of Zookeepers

14th

NATIONAL CONFERENCE / Tucson '88

Dedicated to Professional Animal Care

Editor-in-Chief: Susan Chan
Assistant Editor: Alice Miser
Assistant Editor: Ron Ringer

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From the Editor's Desk

Dear Members,

The editorial staff of *Animal Keepers' Forum* is pleased to bring you this expanded December 1988 issue containing the many fine papers presented at the 14th National AAZK Conference in Tucson, Arizona. Along with these papers are many of the regular *AKF* monthly features including B&H, Chapter News and Coming Events.

We began in 1981 combining the conference proceedings into an expanded year-end issue. The December issue has gotten bigger and bigger every year. While we have been pleased that AAZK has been able to offer this special issue to the membership for the past seven years, economic realities have forced us to take a closer look at conference proceedings publication. Therefore, this will be the last year in which the conference proceedings will be incorporated into an expanded issue of *AKF*. Beginning in 1989, each member will receive 12 regular-sized issues of the journal. The proceedings from the 1989 AAZK National Conference to be held in Syracuse, New York, will be printed separately. Those delegates attending the conference will receive a copy of these proceedings with the cost of this publication being built into their registration fee. A limited number of additional copies will be printed and made available to those not able to attend the conference. These will be offered for sale at the lowest price we can establish and still cover printing and mailing costs.

We realize it is difficult to give up something you have become used to. However, please consider the economic impact to AAZK of continuing to offer the expanded conference proceedings issue to all members at no additional charge. The current membership fees established by AAZK just barely cover the costs of administering each membership for one year (includes cost of printing *AKF*, postage for mailing, envelopes required for mailings outside of USA, administrative costs of maintaining each membership, salaries for two part-time AAZK employees, office maintenance costs, etc.) When you receive your *Forum* each month, it may not occur to you the numerous costs behind each issue, but they have to be paid nonetheless. This cost per member ratio is particularly impacted by the lower-priced membership categories which comprise nearly 50% of the total AAZK membership.

It is the wish of the AAZK Board of Directors to keep membership prices affordable to all those wishing to be part of our Association. In order to avoid a membership fee increase, it is now necessary to eliminate this gratis conference proceedings issue. While we regret having to take this step, we feel we have been fortunate to be able to offer it to our members for as long as we have as we think you will find few, if any, other organizations which have provided this "extra" to their members.

As AAZK continues to grow and become involved in more and more projects benefiting our profession, the costs of maintaining these projects grows. Your membership dollars do not go just to publish *AKF*, but to assist in funding such important publications as the *Diet Notebook*, *Biological Values for Selected Mammals*, the *Zoonotic Diseases Handbook*, as well as the many other projects in which AAZK is involved. AAZK is not an association "out to make a buck" and we generally operate on pretty much a shoe-string budget. We hope you will understand and accept the necessity for this decision.

At year's end, the editorial staff would like to thank all those who have contributed to *AKF* during 1988. You make the journal possible and your continued support will keep it growing and improving. In our 14th year of continuous publication, we want to strive to make it an even more informative and useful reference for all those involved in captive exotic animal care. With your help, we know we can succeed.

We look forward to 1989 as being another great year for AAZK and *AKF*. As always we welcome your comments and suggestions. Your continued commitment to and support of the Association will take us into the next decade even stronger and more professional. Here's to a great year!

Susan D. Chan
Editor-in-chief

Alice Miser
Assistant Editor

Ron Ringer
Assistant Editor



Coming Events

Restoration: The New Management Challenge

Jan. 16-20, 1989

Oakland, CA

First annual conference of the Society for Ecological Restoration & Management Program will include papers, poster sessions and special lectures and workshops on the topics of restoration of national parks and on setting standards for the evaluation of restored ecological communities. Abstracts of papers must be received by 15 Nov. 1988 to be considered. For further information and registration forms write or call: S.E.R.M. Annual Meeting, 1207 Seminole Highway, Madison, WI 53711 (608) 263-7889.

NOTICE: The Scholl Conference on the Nutrition of Captive Wild Animals will not be held in 1988. The next Nutrition Conference will be held in late 1989 at the Lincoln Park Zoo. Any persons interested in submitting papers for the 1989 conference should contact: Dr. Thomas P. Meehan, Lincoln Park Zoo, 2200 N. Cannon Dr., Chicago, IL 60614 (312) 294-4689.

Wildlife Rehabilitation Symposium

March 22-26, 1989

Anaheim, CA

Hosted by Pacific Wildlife Project. Topics will include: veterinary advances in wild species; rescue, restraint and handling techniques; avian, reptile and mammal treatment and biology; captive breeding; wildlife urbanization; post-release and population studies; cage design; conservation education programs; administration and project fundraising. Concurrent presentations will be offered for beginning, advanced and professional levels of expertise. Professional sessions will be limited to veterinarians and medical professionals. Those interested in submitting manuscripts contact: Richard E. Evans, DVM, MS., NWRA Program Chair, P.O. Box 7671, Laguna Niguel, CA 92677, (714) 831-1178. For other information or registration materials contact: MWRA Host Committee, Pacific Wildlife Project at the address above.

Fertility in the Great Apes

June 15-17, 1989

Atlanta, GA

Sponsored by Yerkes Regional Primate Research Center of Emory University, Zoo Atlanta and the National Zoo. For preregistration and information contact: Dr. Kenneth G. Gould, Yerkes Regional Primate Research Center, Emory University, Atlanta, GA 30322 (404) 727-7720.

AAZPA REGIONAL CONFERENCES

AAZPA Great Lakes Regional: March 5-7, 1989. For more information contact: Mike Blakley, Curator/Mammals, Kansas City Zoo, 6700 Zoo Drive, Kansas City, MO 64132 (816) 333-7406.

AAZPA Western Regional: March 19-21, 1989. For more information contact: Murray Newman, Ph.D., Director, Vancouver Public Aquarium, P.O. Box 3232, Vancouver, B.C., Canada V6B 3X8 (604) 68503364.

Coming Events. *Continued*

AAZPA Southern Regional: April 2-4, 1989. For more information contact: Terry Maple, Ph.D., Director, Zoo Atlanta, 800 Cherokee Ave. SE, Atlanta, GA 30315 (404) 624-5600.

AAZPA Central Regional: April 16-18, 1989. For more information contact: Hayes Caldwell, Director, Caldwell Zoo, P.O. Box 428, Tyler, TX 75710 (214) 593-0121.

AAZPA Northeast Regional: April 30-May 2, 1989. For more information contact: Minot Ortolani, Director, Buffalo Zoo, Delaware Park, Buffalo, NY 14214 (716) 837-3900.



Important Election Reminder

In 1989, two seats on the AAZK Board of Directors will be filled by an election to be held in the spring. The deadline is fast approaching for the submission of nominations for individuals to run for these positions. The deadline for submission of the nomination forms is **30 January 1989**. The forms may be found in both the Sept. and Nov. 1988 issues of **AKF**. The nomination forms will be printed again in the January 1989 issue. The forms list the duties of the Board of Directors, the qualifications for nomination, and the nomination procedures. **PLEASE take the time NOW to complete the forms for the candidate you wish to nominate and return them by the January 30th deadline to Nominations & Election Chair Rachel Rogers, Metrozoo, 12400 S.W. 152 St., Miami, FL 33177.**

AAZK Announces New Professional Members

Donald Winans, New England Sci. Cntr. (MA)	Kelly Gruninger, Central Prk. Zoo (NY)
Barbara Welsted, no zoo listed	Randy Caldwell, Catocin Mt. Zoo (MD)
Heidrun Przybylowicz, Catocin Mt. Zoo (MD)	Bob Collins, Sea World (FL)
Jody Rosier, Sea World (FL)	Wilbur Thompson, Sea World (FL)
Tiffany Stine, St. Augustine Alligator Farm (FL)	Beth Pohl, Columbus Zoo (OH)
Gregory Lepera, St. Augustine Alligator Farm (FL)	Lynne Villers, Indianapolis Zoo (IN)
Carol S. Jackson, Zool. Soc. of Middle Tenn. (TN)	Lynn Massie, Mesker Park Zoo (IN)
Jeanne Jacobsen, Ft. Worth Zoo (TX)	Scott Shaffer, Sea World, Inc. (CA)
David S. Marcos, San Diego Wild Animal Prk (CA)	Robert L. Estes, Honolulu Zoo (HI)
Gwen Berends, Palo Alto Jr. Museum/Zoo (CA)	Diane Gould, Washington Park Zoo (OR)
Andrea Jarmai, Metro Toronto Zoo (Ontario)	Greg Nowak, Metro Toronto Zoo (Ontario)
Maureen L. Anderson, Valley Zoo (Edmonton, Alberta)	

New Contributing Members

Research Equipment Co., Inc., Bryan, TX
David G. Sullivan, Zanus Corporation, Menlo Park, CA



Keeper's Alert

A Small Zoo Needs Help: On 25 June, three disabled bald eagles were stolen from the Moonridge Zoo of Big Bear Lake, CA. The following week they were found dead. This heinous act prompted the founding of The Friends of the Moonridge Zoo, whose first goal is to raise funds for an improved security system. The Moonridge Zoo is a small establishment which offers protection to the injured wildlife of the San Bernadino Mountains. For further information please contact: Carol Dingley, The Friends of the Moonridge Zoo, P.O. Box 2557, Big Bear City, CA 92314 (714) 585-6908.

Births & Hatchings



Los Angeles Zoo...reported for September and October 1988 were the following: Primates - 0.3 Cottontop tamarin, 0.0.1 Red howler, 1.0 Celebes macaque, 3 Emperor tamarin, 1 Gelada baboon; Hoofstock - 1.0 Sable, 2.0 Nyala (1.0 DNS), 3.0 Bongo, 0.0.1 Grevy's zebra (aborted), 0.1 Arabian oryx, 1.0 Harnessed bushbuck (L.A. is one of only three zoos in North America to exhibit this beautiful antelope; this calf represents our first birth for this species), 2.0 Giant eland (1.0 DNS) (L.A. and Cincinnati are the only zoos in North America to exhibit these rare, magnificent antelope. Between the two zoos there have been 5.0 calves born, but unfortunately, only 0.2 have survived - 1.0 at each facility); Mammals - 1.2 Mountain lion (stillborn), 1 Hippo (DNS) and 0.1 Grey seal (DNS). *submitted by Kim Brinkley, Chapter Liaison, Los Angeles Zoo AAZK Chapter, Los Angeles, CA.*

Fresno Zoo...the Herpetology Dept. over the last six months has had the following B&H: 0.0.17 Catalina Island rattlesnakes born to three females, 0.0.2 Giant skin sloughing geckos, 0.0.22 Mauritius Island lowland forest day geckos (2 DNS), and 0,0,1 Reunion Island ornate day gecko. The Bird Dept. has had the following hatchings since 1 May: 0.0.1 Southern lapwing, 0.0.1 Cinnamon teal, 0.0.5 Ringed teal, 0.0.2 Yellow billed hornbill (1 DNS), and 0.0.8 Blue necked ostrich (6 DNS). In addition, since the opening of our Tropical Rainforest Exhibit in May, 0.0.2 Green honeycreepers hatched out in the Hummingbird House and a 17-year-old female Black-necked stilt laid her second clutch of eggs since being moved into the Rainforest with one chick having been hatched. The Mammal Building births since May have included 0.0.1 Scimitar-horned oryx, 1.0 Siamang and 0.1 Mandrill - this female's first birth and she is proving an excellent mother. It is also notable as it is the first Mandrill birth at the Fresno Zoo. *submitted by David Luce, Chapter Liaison, Fresno Zoo AAZK Chapter, Fresno, CA.*

Louisville Zoo...the Louisville Zoo is very proud to announce the recent discovery of having the oldest living captive sable antelope (*Hippitragus niger*). Her name is "Lady" and she turned 21 last September 26th. Records show that the oldest sable before Lady was 19 years and nine months. The Louisville Zoo received Lady in July of 1968 from the Catskill Game Farm in New York. When she arrived she was a year old.

She may not be the prettiest sable on display (see photo) because she has lost both of her horns (due to age) and appears overweight. Actually, Lady is pregnant and, despite her age, produces a calf every year.

Lady is a very impressive animal. I have worked with her for a little over a year and she, like all animals, has her own personality. There are times when she's difficult to work with and other times when she's very easy going. She has chased as number of keepers up on rocks or out of the yard and then there are times when she will allow you to stand very close to her.

Lady also has quite a bit of courage. I have seen her go head to head with the other adult female sables. This seems courageous because when animals lose their natural defense, which Lady did when she lost her horns, they become an outcast from the group and wind up being picked on. With Lady, it's different. She bounces right back and does not allow the others to push her around. The Louisville Zoo is very proud to have Lady as part of its sable collection. *submitted by Lori Taylor, Keeper, Louisville Zoological Gardens, Louisville, KY.*

Births & Hatchings. *Continued*



Lady, 21-year-old sable antelope at the Louisville Zoo. Believed to be the oldest of her species in captivity, Lady is pregnant and has produced a calf each year despite her advanced age.

Busch Gardens/Tampa...B&H for October included: 1.2 Grevy's zebra, 1.0 Grant's zebra, 3.1 Thomson's gazelle, 0.0.1 Black spider monkey, 0.2 Sitatunga, 0.1 Addra gazelle, 1.0 Sable antelope, 0.1 Scimitar-horned oryx, 0.1 Reticulated giraffe, 0.0.3 Quaker parakeet, 0.0.2 East African crowned crane, 0.0.3 Red-billed tree duck, 0.0.3 Sun conure, 0.0.1 Blue and gold macaw, 0.0.2 Rainbow lorikeet, 0.0.2 Chattering lory, and 0.0.8 Jandaya conure. *submitted by Mary Eisenacher, Animal Records, Busch Gardens, Tampa, FL.*

Zoo Atlanta...reported B&H for 15 July through 15 October include 0.0.2 Bog turtle, 0.0.3 Wood turtle, 0.0.4 Spotted turtle, 0.0.8 Leopard gecko, 0.0.8 Indigo snake, 0.0.21 Eastern diamondback rattlesnake, 0.0.2 Cornsnake, 0.0.8 Mexican bush viper and 0.0.7 Sidewinder.

In the Bird Dept. hatchings included: 0.0.4 Ring-necked duck, 0.0.3 Peafowl and 0.0.7 Guinea fowl. In the Mammal Dept. we had 6.0 Vietnamese pot-bellied pigs born. Acquisitions for all three departments include: 0.0.1 Box turtle, 1.0 Black mamba, 3.3 Vietnamese wood turtle, 0.1 Ball python, 2.2 Western lowland gorilla (for a total of 14 animals, 5.9) 2.2 Sumatran orangutan (for a total of 8 animals, 3.5), 2.2 Cherry crowned mangabey, and 1.1 Bengal tiger cubs on loan from Columbus, OH. *submitted by Tim Kurkowski, Co-vice president, Zoo Atlanta AAZK Chapter, Atlanta, GA.*

Dickerson Park Zoo... this year started off badly with a fire that destroyed our nursery. We have hopes that it will be fully restored early in 1989 for the next generation. B&H from January through October 1988 include: Mammal Dept. - 0.1 Giant red kangaroo, 1.1 Reeve's muntjac (1 DNS), 0.2 Black-tailed jack rabbit, 0.1 Giant Indian fruit bat, 0.1 Mandrill, 1.1 Kykuyu monkey, 0.1 Grant's zebra, 1.0 Senegal bushbaby, 1.0 Celebes crested macaque, 0.0.1 Ring-tailed lemur (this baby was missing after a fight in the troop, and the mother was severely injured), 0.0.1 Goeldi's monkey, 1.0 Baringo/Reticulated giraffe, 2.0 Jungle cat (both were eaten by their first-time mother);

Bird Dept. - 0.0.3 Blue and gold macaw (one disappeared from the nest), 0.0.33 Indian blue peafowl, 0.0.3 Green-cheeked amazon parrot, 0.0.6 Egyptian goose, 0.0.16 Ostrich (12 DNS), 0.0.2 Mute swan, 0.0.2 Common rhea, 0.0.7 Indian ringdove, 0.0.2 Common pintail, 0.0.2 Australian crested pigeon (1 DNS), 0.0.4 Bald eagle (3 DNS) (our first parent-raised eagle which was later released in the wild);

Births & Hatchings, Continued

Reptile Dept. - 0.0.12 Bullsnake (1 DNS), 0.0.6 Western pigmy rattlesnake (3 stillborn).
submitted by Melissa Carden, Animal Keeper, Dickerson Park Zoo, Springfield, MO.

Columbus Zoo...during the months of August-October 1988, the Columbus Zoo experienced a multitude of notable Aquarium hatchings and acquisitions, our first yellow-backed duiker offspring, this year's fourth and fifth cheetah litters, and several significant animal acquisitions.

Our Aquarium has been the scene of extensive renovations the past several months, in terms of both exhibit designs and building repairs. Its collection has also been changed substantially, with new species and new bloodlines for extant species being added. Among the most notable additions were wild-caught Benga peacocks (*Aulonacara bengalensis*), an African cichlid displayed for the first time in Columbus; 1.1 *Chaetodon declivis*, which, as far as can be determined, is the only pair of this deepwater butterfly fish on display in the U.S.; and 2.3 Salton Sea pupfish (*Cyprinodon macularius*), an endangered species that has spawned at the Zoo. We have also built up an extensive collection of primitive fish, containing specimens of all lungfish species and most of the Polypterid species. Other notable additions include 0.0.3 Asian arawana (*Scleropages formosus*); 1.1 *Pomacanthus asfur* and 1.0 *Pomacanthus chrysurus*, both types of angelfish from the Red Sea; 1.0 *Chaetodon falcifer*, a deepwater butterfly fish found in cold waters; and 0.0.1 *Zebrafish* *rostratum*, a black tang found only around Christmas Island. In addition to the 30-40 pupfish we have hatched, other important spawnings include Benga peacock, 4 Striped damselfish (*Dascyclus melanurus*), Blue regal peacock (*Haplochromis ovatus*), an African cichlid, and Trewavasae (*Labeotropheus trewavasae*), another African cichlid. The cichlid hatchings are notable because the parents were wild-caught, thus adding new bloodlines to the U.S. populations.

Among our Reptile Dept.'s productive output for this three-month period (148 animals hatched), three hatchings are particularly notable because this is the first time all three species bred at the Zoo. However, we have had offspring before because we received females that were already gravid. These hatchings were: 3 Pancake tortoise (*Malacochersus tornieri*), 3 Emory's rat snake (*Elaphe g. emoryi*), and 14 Beaded dragon (*Amphibolurus vitticeps*). We have had high infant mortality with beaded dragon infants in the past, and the cause was pinpointed to calcium and phosphorus deficiencies. However, we now utilize a diet obtained from the Toledo Zoo, which involves sprinkling their crickets, waxworms, mealworms, and produce with various vitamins and minerals. So far this diet has proven extremely effective, and all 14 offspring are doing well.

Once again, our Cheetah (*Acinonyx jubatus*) breeding program has yielded outstanding results with two litters produced. 1.2 cubs were born to Stinky and Duey. This was Stinky's third litter and her second for this year, and it is the first time she is raising them on her own. 4.1 (1.0 DNS) cubs were born to Johari and Duey. This was Johari's second litter, and the Zoo was able to videotape her giving birth. Johari's litter was the fifth cheetah litter this year for Columbus, the first time we have had so many in one year. Our cheetah statistics so far for 1988 show five litters with 18 cubs, with 5.4 surviving.

On 13 October, the Zoo witnessed our first Yellow-backed duiker (*Cephalophus sylvicultor*) birth, a male that DNS. This was the third offspring from the seven-year-old mother, on breeding loan from the National Zoo, and the first for the two-year-old father, purchased from the Dallas Zoo. The infant seemed unable to obtain sufficient milk and started to lose weight. We began a schedule of supplemental bottle feedings while still leaving the baby with his mother. However, he died after eight days.

In addition to the above offspring, we have also had some exciting acquisitions. Two new cervid species now reside in Columbus. We have purchased 1.1 Red brocket deer (*Mazama americana*) from the Bronx Zoo that are both a little over a year old. These small deer are native to Central and South America where their status is undetermined, but they are

Births & Hatchings, Continued

seldom seen in U.S. zoos. We have also obtained 1.2 Reindeer (*Rangifer tarandus*) that will be displayed in our Children's Zoo barn and used in the Zoo's Christmas programs this year.

Several noteworthy individuals have also been obtained. On 5 October, we received a 12-year-old female Lowland gorilla (*Gorilla gorilla*) named Molly from the Kansas City Zoo. She will be introduced to our male, Bongo, soon. On 7 October, we received a new female Bald eagle (*Haliaeetus leucocephalus*) from Patuxant Wildlife Research Center, Laurel, MD. She is five years old and is capable of flight, although she is non-releasable. She has laid eggs and raised chicks at Patuxant, and she will be paired with our male, George. George's mate, Georgina, died of aspergillosis in July at the age of 25 years. George and Georgina hatched nine chicks, of which four survived. Some of these were hacked into the wild.

Finally, our Southern white rhinoceros (*Ceratotherium simum simum*) pair were joined by a new female, 24-year-old Luanne, on breeding loan from the Louisville Zoo. Prior to this, Luanne was at Kings Island Wild Animal Habitat. Our pair, Pandullah and Mama (both are 21 years old) are wild-caught, as is Luanne, and this makes all three very valuable to the U.S. gene pool. White rhinos traditionally do not breed in pairs, and this was the case at Columbus. Thus Luanne was recommended to us by White Rhino SSP Coordinator Bob Reece. Luanne is a very vocal rhino, roaring and grunting alot at the other two, but she has integrated well with them. We hope that her presence will stimulate Pandullah to breed both females. *submitted by Carl Gyarmaty, Chapter Liaison, Columbus Zoo AAZK Chapter, Columbus, OH.*

Attention all B&H contributors: Beginning with the January 1989 issue of *AKF*, we will no longer publish submissions which consist only of a numerical listing of births and hatchings. We have tried in the past year to encourage contributors to submit their B&H information in a text format, noting why these B&H are significant to their institutions (i.e., first ever captive reproduction, first ever for the facility, first second-generation, SSP species, reproduction due to change in exhibit or husbandry techniques, etc.) Two good examples of how we would like submissions sent are those from the Columbus Zoo and Bronx Zoo in the October 1988 issue (page 302-303). We would also ask that all those submitting B&H please include the scientific name (as per ISIS) following the common name of species listed. We greatly appreciate those individuals who have continued to submit material for B&H and our goal is to make this section of *AKF* not only more readable and interesting, but to include reproduction data in a context where it may be more valuable to anyone seeking information of captive exotic animal births and hatchings. We know it will mean a little more work on your part, but we feel the effort will be well worth it and we appreciate your assistance. *The Editor*



OVERVIEW OF THE 1988 AAZK BOARD OF DIRECTOR'S MEETING

Submitted by

*Susan D. Chan, Editor Animal Keepers' Forum
and Frank B. Kohn, AAZK President*

The meeting was called to order on 10 September 1988 at 9:45 a.m. by President Frank B. Kohn. Board members present were: Frank Kohn, Oliver Claffey, Bob Debets and Brint Spencer. Due to flight delays, Board Member Susan Barnard was not present for the morning session, but was present for the afternoon session. AKF Editor-in-chief Susan Chan served as recording secretary in the absence of AAZK Administrative Secretary Barbara Manspeaker. The Board of Directors met in closed executive session on 10 September and held open board meetings to which all members were invited on 11 September, 1988. All Board Members were present during the open meetings.

National Headquarters - report submitted by Barbara Manspeaker

It was reported that as of 31 July 1988 we had 2,383 members. This is an increase of 201 members (approx. 9%) over what was reported last year at conference time. No increase in membership fees was proposed, although Barbara noted that due to rising costs of the Association, we can no longer depend solely on membership fees to fund AAZK's various projects and programs.

The financial statement was submitted to the Board. It was reported that our main source of revenue is derived from membership fees. The total revenue received through 31 July 1988 was \$38,041.78. Of this figure \$29,970.00 represents membership fees. The importance of having line items in our budget was again emphasized for the proper planning of the 1989 AAZK annual budget.

AAZK has engaged an attorney to assist us in our efforts to be reclassified with the Internal Revenue Service as a "non-profit" organization (501 C-3). We are currently a "not-for-profit" organization. This new status will allow the Association to accept donations, apply for grants and will offer substantial savings in our bulk mailing expenses. Part of this process includes revising of the Statement of Purpose, amending of the Articles of Incorporation and revising and updating the existing By-laws. AAZK staff was advised that while we have a better than 50% chance of being granted the new status, it will be a lengthy process and could take up to two years.

At the suggestion of AAZK staff, the Board has redesignated AAZK National Headquarters as AAZK Administrative Offices. The Board also requested that the staff check into implementing the use of either a VISA or Mastercard account by the Administrative Offices whereby members could charge their membership fees and/or publication and accessory purchases. The Board also requested that AAZK staff explore the possibility of having a separate phone line installed rather than continue receiving calls through the Topeka Zoo switchboard. The staff was also asked to check into the acquisition of a long-distance phone card for AAZK. The staff will report on these items to the Board at the mid-year meeting.

In order to generate additional funds, the AAZK staff has been asked by the Board to send out letters to zoological societies soliciting institutional memberships from them. This is one way in which zoo societies would be able to show support for their zoo's keeper staff.

A \$500 annual budget was approved for the President of AAZK with an additional \$500 budget for the remaining Directors. As approved in 1987, it was decided to continue the

Overview of 1988 Board of Directors Meeting, Continued

funding of the AAZK President to attend the annual AAZPA Conference as the Association's representative; and to fund the expenses of the AAZK staff to attend our annual national conference. The Board approved a 50 cent per hour increase in wages for Susan Chan and Barbara Manspeaker with the option of increasing this amount by an additional 25-50 cents per hour once the budget is finalized and if funds are available for such an increase. The Board also requested that AAZK staff have a proposal on an IRA plan ready for review at the mid-year meeting.

Animal Keepers' Forum - report submitted by Susan Chan

Susan reported that 1988 marked the 14th year of continuous publication for *AKF*. Changes continue to occur in the publication due to the use of the desktop publishing system giving it a more finished and professional appearance. Profiles on new Board members Bob Debets and Brint Spencer were run this year and a series of profiles on Regional Coordinators has begun. Susan reported that Chapter Liaisons/Officers have been very good about sending in Chapter News items. She also reported that the Book Review Project now under Rick Emmer has taken off with a number of books currently out to be reviewed. John Stoddard has done an exceptional job keeping members informed of current and upcoming legislative matters through the Legislative Update column. The Viewpoint column has been busy this year with the ongoing discussions about zookeeper professionalism. *AKF* published a number of surveys this year including those on Keeper Video Training Tapes, Zookeepers in Public Education and Keeper's Interest in Zoo Research.

Susan reported that submissions to *AKF* continue to come in at a good rate with several months' worth of articles "on hold" at any given time. *AKF* has received quite a few submissions from foreign keepers and zoos this year. More photos were used this year and Susan encouraged those submitting articles to include photos for publication.

Following discussions with Board members and other interested parties, it was decided to try to establish a review process for the more research-oriented articles. Hopefully a list of specialist reviewers will be established by the first of the year and we will give the review process a try. Because of the problem of misuse or deletion of scientific nomenclature in articles for *AKF*, it was decided to require authors to use such nomenclature when submitting articles for *AKF* and to use only standard reference sources such as ISIS in determining proper nomenclature. An article will appear in an upcoming issue explaining this procedure and why it is necessary.

Judie Steenberg and Pam Talbot of Woodland Park Zoo have nearly completed the comprehensive index of *AKF* from 1974 to the present. This will not only be a handy reference for members, but will serve as an important historical reference on the growth of AAZK. It will be available to the membership early next year.

The Board also approved the manner in which Conference Proceedings will be handled in the future. Beginning with the 1989 Conference in Syracuse, the proceedings will be published separately and not be included in an expanded issue of *AKF*. This is due solely to the expense involved per member vs. the individual amounts of membership fees. While AAZK has been pleased to be able to offer the proceedings at no charge to the membership for the last seven years, it is no longer financially possible. Therefore, beginning in 1989 the Conference Proceedings will be sent to all delegates to the national conference and will be included in the price of their registration. Additional copies of the Conference Proceedings will be available for sale to those interested in having a copy.

Other publications: The *Zookeeping as a Career* brochure remains a popular item for spreading word about both zookeeping and AAZK. The Public Education Committee is revising the text and photos before another printing and will have these revisions ready for Board approval by the mid-year meeting. The *1988-89 AAZK Membership Directory* was completed and mailed early this summer. There is still some question as to whether the expenses involved in producing such a directory are warranted by its use. The Board

Overview of 1988 Board of Directors Meeting, Continued

asked Susan to explore the possibilities of publishing a much less formal membership directory (possibly photocopied on 8 1/2" x 11" paper with an option of making it available on computer disk) which could be produced every year at less cost to the Association while still making the information available to the membership. Susan will report at the mid-year meeting. Due to the career move of former chairperson Steven Wing, the *Handbook of Mother-Reared Infants* project has made little forward progress. A new chairperson and committee need to be established to regenerate this project.

AAZK Diet Notebook, Mammals, Vol. I - report submitted by Susan Bunn

The publication has been completed and was available for sale at the 14th National Conference. The Assiniboine Park Zookeepers Association, Winnipeg, Manitoba, Canada provided funding for the first 450 copies. Prices were established as follows: AAZK Members - \$40.00; Non-Members - \$55.00; and Institutions - \$70.00. Mail order sales began in October. A proposal was submitted to hire a part-time staff person to complete work on the remaining volumes of the notebook. The Board favored this idea providing the salary for such a staff person could be obtained from outside sources (i.e., grants or companies receiving advertising in Volume I). Goals for the project in 1989 will include: preparation for the publication of the Bird Section, work on Mammals, Vol. 2 and preparation of the Appendix. Susan proposed having the Diet Notebook reviewed by several professional journals in order to give it more exposure. She is also working with Bronx Zoo nutritionist Ellen Dierenfeld on the possibility of a joint AAZK/AAZPA project to analyze the diets more fully for nutritional make-up and benefits. Projected estimates show that the profits made from the sale of Mammals, Volume I should prove adequate for funding the Bird Diets Volume. (Supplements to the Mammals volume will be available at a later date.) To this end, a separate checking account has been set up to handle all financial transactions relating to the Diet Notebook project. A budget of \$725 was approved to cover postage, phone expenses, computer discs/paper, etc. for this project.

Biological Values for Selected Mammals III - report submitted by Toni Danzig

The Greater San Francisco Bay Area AAZK chapter is completing work on the third edition of this reference work. Anticipated publication date is early in 1989. The revised edition will include approximately 200 more species than the previous edition, an expanded list of values per species, and a revamped bibliography which reflects more current scientific/academic reference sources. Since incidental expenses for this project have been generously covered by the GSFBA Chapter, no budget was requested for 1989.

Zoonotic Diseases Handbook, 2nd Edition - report submitted by Bruce Clark

This reference work has been revised, edited, reviewed and expanded. It is being put into a new format for its second printing (i.e., *AKF* size with information in text rather than chart form). The data is on computer disk and is currently at AAZK Administrative Offices to be reformatted before publication. Publication date is unknown at this time, but it is hoped to have the Second Edition out sometime in 1989 depending on financing. Although no budget was requested by editor Bruce Clark, the Board approved a budget of \$25.00 to cover postage and phone calls related to the project.

Nominations & Election Committee - no report submitted due to off-election year

Rachel Rogers, Miami Metrozoo, has been appointed chair of this committee. Election of two Board of Directors will occur in June 1989 and nominations must be received no later than 31 January 1989. Watch *AKF* for nomination/nominator forms and further information. A budget of \$500.00 was approved to cover costs of the election ballots, mailing expenses and phone calls.

Overview of 1988 Board of Directors Meeting, Continued

Regional Coordinator Chapter System - report submitted by Chris Garland

Since Diane Krug was out of the country and Debbera Stecher was unable to attend the conference, the RC report was handled by Chris Garland. There are currently 50 active AAZK Chapters and 24 inactive AAZK Chapters. A survey sent out by the RC-Coordinators noted apathy and burnout as two major factors affecting chapter activity. The need to put together a packet explaining guidelines for chapter formation was discussed. Also a list of current chapter activities would be helpful to new and struggling chapters to provide ideas and incentive. It was also suggested that a handbook for RC outlining their duties, responsibilities and offering suggestions on how to motivate chapters would be most useful. The above three mentioned items will be worked on this year. It was reported that having Chapter Liaisons at the local level has, in many cases, made communication between the local group and AAZK Administrative offices more productive and efficient. In the States East of the Mississippi, Bill Whittaker, Toledo Zoo, has organized a board of directors of the Great Lakes region comprised of Chapter Liaisons from that area. They meet quarterly to discuss projects, problems, new events, etc. This has been very successful in keeping the lines of communication open. Bill has a 100% rate of participation by liaisons.

A number of RC positions were vacant at the time of the conference. Several have been filled including: Colleen Kinzley for the States of WI, IL, IA, MO and MN; Elandra Aum for the States of WA, OR, ID, MT, WY and AK; and John Brangan for the States of PA, DE, NJ, MD and District of Columbia. Vacancies still exist for the States of LA and MS and for the States of ME, VT, NH, MA, RI and CT.

A budget of \$300.00 was approved for the two RC Co-Directors. The North Carolina Chapter is sponsoring a raffle of a 7-day cruise to raise funds for the RC system. Profits from the raffle will be split 60-40 with AAZK Administrative Offices and the North Carolina AAZK Chapter. AAZK's portion will be used to fund activities of the RC Chapter System.

Zoo Stories Book - report submitted by John Stoddard

The Brookfield Zoo AAZK Chapter has produced a book entitled *What Kind of Animal Are You?*, a collection of zoo keeper's favorite anecdotes about their work, the animals and the visitors. Proceeds from the sale of the book will be split 50/50 between the Chapter and AAZK. The books are available from the Brookfield Chapter at \$4.20 per copy which includes postage and handling. Members are asked to encourage zoo bookstores and gift shops to carry this book.

Chapter Liaison Packets - no report submitted

The Packets were designed to provide information to Chapters on AAZK, its goals, projects and programs. They are an important reference source for Chapters and need to be available, especially to newly forming Chapters. The project will come to AAZK Administrative Offices to insure that those needing the packets receive them in a timely fashion. Further revision and additions to the information packet will be made this year.

By-Laws Review Committee - report submitted by Marilyn Cole

This committee became active in 1987 and will be an ongoing review committee. Suggestions for changes and needed revisions were solicited from the membership, RC's and project chairs. The committee put together the proposed By-law revisions/additions and these were advertised to the membership via *AKF*. Additional minor changes were suggested during the general membership meeting at the Tucson conference and were

Overview of 1988 Board of Directors Meeting, Continued

incorporated into the body of the By-laws before a vote was taken on their adoption. The by-laws revisions were unanimously adopted by delegates attending the general membership meeting. The Board has requested AAZK staff to have the new By-laws and Statement of Purpose printed and these will be available after 1 January 1989. They will be sent to all new members and upon request will be mailed to existing members. A budget of \$25.00 was approved for 1989.

AAZK History Committee - oral report given by Art Goodrich

Art reported that the Founder's Day Weekend held in May of 1987 was a success and that the conference broke even on expenses. Commemorative T-shirts left over were distributed to chapters to use during fundraisers and several were saved for historical purposes. AAZK's 25th anniversary will occur in 1992 and Art noted that several of the original founders have expressed interest in attending. Art suggested that bids to host this anniversary conference be taken in 1989 in order to allow the host chapter extra time to prepare for this AAZK milestone. He also reported that a special commemorative book will be published for the 25th anniversary. A budget of \$50.00 was approved for this committee to cover postage and phone calls.

International Affairs Coordinators - reports submitted by Pam McDougall (west) and Lisa Bauer Saban (east)

It is the responsibility of the International Affairs Coordinators to maintain a liaison with our sister zookeeping organizations abroad, to coordinate activities of the Foreign Keeper Sponsorship Program, and to communicate with our overseas members. As of their report we have approximately 45 international members from the following countries: Australia, Bahamas, Belize, Bermuda, Brazil, Great Britain, Germany, Ghana, Guatemala, India, Indonesia, Ireland, Japan, Mexico, Newfoundland, Panama, Puerto Rico, Singapore, Switzerland, Taiwan, The Netherlands, West Indies and Zimbabwe. AAZK chapters and individual members currently sponsor seven Sponsored Foreign Keepers in India and one in Zimbabwe. Both Coordinators have information on foreign keeper sponsorship candidates for interested AAZK Chapters or members. Both Coordinators receive the publications of our overseas counterparts and one goal this year is to make the contents of these journals known to AAZK members (i.e., a listing in *AKF* of the Tables of Contents of *Ratel* and *Thylacinus*) so that they may order reprints of articles of interest to them. A budget of \$100.00 was approved to cover the two Coordinator's expenses involved in their duties.

Keeper Education Committee - report submitted by Pat Sammarco

Chairperson Pat Sammarco reported at the Conference that her committee remains a coordinating arm for projects related to zookeeper education. Many of the projects originally under this committee (for example, Keeper Training Materials Identification) have become independent projects. Pat noted that she will chair a Staff Training Workshop at the 1988 AAZPA Conference in Milwaukee, WI. A budget of \$35.00 was requested and approved.

Public Education Committee - report submitted by Ellen Bradfield

The Public Education Committee grew out of the Keeper Education Committee in order to address the need for public awareness of AAZK, zoos, and their roles in conservation. During the past year the Committee has been working on the following projects: 1) Zoo Question Column in *AKF* coordinated by Ellen Bradfield; 2) Zookeeping Video (coordinated by Melody Cavanary, Susie Kasielke and Chuck Smith); 3) Zookeeping Poster (coordinated by Tom LaBarge); 4) AAZK Membership Information Display (coordinated

Overview of 1988 Board of Directors Meeting, Continued

by Ellen Bradfield); 5) AAZK Display Board for use at zoological conferences (Bob Debets, Coordinator); and 6) AAZK Zookeeping as a Career Brochure (Ellen Bradfield and Tim Kurkowski).

The Board requested that the Committee have a final draft of the revised text for the Careers Brochure by the mid-year Board meeting. This is a very popular item and is in need of reprinting to meet the demand for it by schools, zoos, zoo societies and the public. Photos are still being collected for the AAZK Poster project. It was also suggested that the Committee solicit members to put together guidelines for putting on a Wildlife or Conservation Day. Judie Steenberg and Chris Garland will work on this project. No update was received on the Zookeeping Video so the Board decided that no funds would be budgeted for this project until more details are obtained. A budget of \$20.00 was approved for the Committee's postage expenses.

Research/Grants Committee - report submitted by Kaci Thompson

Despite the fact that numerous requests for grant application packets were received and distributed in 1988, no completed grant applications were received. Kaci plans to distribute information on the program and packets directly to zoo curators to perhaps encourage keepers to apply for grants. She also provided information on AAZK to several grant registers during 1988. She has compiled a bibliography of books and articles on conducting behavioral research and research in zoos. The list of alternate sources of funding for zoo research, begun in 1987, is near completion, with 31 grants listed. Kaci suggested that AAZK put together a poster for display at AAZK and AAZPA conferences outlining the grants program. The approved budget for 1989 was \$1025.00 made up of two \$500.00 grants and \$25.00 for committee expenses.

AAZK Awards Committee - report submitted by Rachel Rogers

A very complete report on this committee's history and activities was submitted. The report included the nominations procedures, a listing of the candidates and winners, and an outline of expenses incurred. To incorporate those institutions not classified as zoos or aquariums, the wording of the Awards Committee rules was changed to reflect that individuals from "related facilities" were also eligible for nomination. Because of a conflict which arose this year when an Awards Committee member was nominated for an award, the Board approved a proposal to make all committee members, including the chair, ineligible to receive an award nomination while they are serving on the committee. Clarification was made on two special awards: 1) the Certificate of Appreciation is intended to show appreciation by AAZK for an individual outside of the Association for deeds on behalf of AAZK; 2) the Certificate of Recognition is intended as an honorable award given to an outstanding individual within the Association for recognition of deeds on behalf of AAZK. Both of the above awards are proposed and voted on by the Board of Directors. All other AAZK Awards are voted on by the Awards Committee members. Rachel further requested that the need to add "institution (name, address and phone)" to the nomination form was essential in order to verify and document nominee's eligibility. This was approved. Rachel has resigned as chair of the Awards Committee to assume other AAZK duties. Jan McCoy, Washington Park Zoo, succeeds her as Awards Committee Chair. A budget of \$200.00 was approved.

AAZK Liaison to AAZPA/IZE/LSIG - report submitted by Brandy Pound

For the past several years Brandy Pound, Education Coordinator for the San Francisco Zoo, has served as the AAZK Liaison to the AAZPA, International Zoo Educators and the Librarians Special Interest Group. In her position Brandy has served to communicate goals and interests between the groups, facilitate cooperation on common projects, and serve as an information base on the organizations. Her work has been most helpful to

Overview of 1988 Board of Directors Meeting, Continued

AAZK in establishing ties with these groups. Due to professional and other commitments, Brandy has reluctantly resigned from this position and a replacement is being sought at this time.

Public Relations Liaison - report submitted by Tim Kurkowski

Tim reported that he continues to serve as an aid to AAZK Administrative Secretary Barbara Manspeaker in handling requests for information on zookeeping as a career from high school and college students. Tim fields requests received at Administrative Offices which require more than a career brochure. He personally writes to these individuals detailing the zookeeping career, its educational requirements, scope of the profession etc. Tim reported that he has heard back from a number of the individuals with which he has corresponded and that several have actually entered the zookeeper profession. A Budget of \$10.00 was approved to cover postage costs.

Conference Book Committee -no written report submitted due to inactivity

The purpose of this committee was to put together a handbook outlining how to plan and execute a regional or national conference. It would incorporate information from past conference committees and serve as a resource to chapters wishing to bid on hosting upcoming AAZK conferences. Former chair Phil Pennock has resigned and Tim Kelly, Assiniboine Park Zoo, Winnipeg, has taken over this position. It was suggested that the immediate past conference chairman should serve as the permanent chairman on this project to insure continuity, and that other past conference committee people should be solicited for their input and advice. After two years of little activity, it is hoped this handbook can be completed before the 1989 conference. A budget of \$50.00 was approved.

National Conferences - reports submitted by Alan Baker (1989) and Andrew T. Snider (1990)

Alan Baker of the Burnet Park AAZK Chapter reported that the dates for the 1989 AAZK National Conference will be 1-5 October. The Chapter has completed negotiations for a conference hotel site and is receiving good support from their zoological society. Initial plans call for on-site visits to Beaver Lake Nature Center, Ross Park Zoo and Burnet Park Zoo.

Andrew T. Snider of the Audubon Park Zoo AAZK Chapter submitted a bid to host the 16th national AAZK Conference in New Orleans, LA in 1990. This bid was accepted by a vote of the delegates during the general membership meeting.

Library Resources/Reference Search - reports submitted by Marilyn Cole and Kaci Thompson

While Marilyn Cole has been working on reestablishing this committee's function (i.e., collection of bibliography data on zoo animals, etc.) it was suggested that rather than duplicate an already existing effort, Marilyn should coordinate her efforts with those of the Librarians Special Interest Group. The LSIG has already established a database of bibliographies and hopefully AAZK will be able to add to this existing source and help disseminate such useful lists to members needing information. Marilyn will be in contact with LSIG to see what cooperative efforts may prove viable. A budget of \$200.00 has been approved for this project.

Kaci Thompson reported that her major activity in 1988 has been as a liaison with the AAZPA Librarians Group. The purpose of the Library Resources Project is to make keepers aware of how to utilize libraries and locate printed sources of information. Kaci reported

Overview of 1988 Board of Directors Meeting, Continued

that the AAZPA Bibliography Coordinator program has been very successful and has been utilized by many AAZK members. Both of the above committees will continue to coordinate and cooperate with LSIG to provide the best possible resource service to its respective members. A budget of \$20.00 to cover postage was approved for Library Resources.

Book Review Project - report submitted by Rick Emmer

The goals of this committee are to 1) acquaint the reader with interesting, informative, current and potentially useful literature; 2) assist the reader in deciding whether or not to obtain the reviewed material; and 3) provide the information required to obtain the material. Rick has solicited book reviewers via AKF and editor Susan Chan has made him aware of books sent to Administrative Offices for review. Rick hopes to have enough books reviewed to provide a regular book review section in each month's AKF. A budget of \$50.00 was approved for postage and phone calls of this committee.

Legislative Adviser - report submitted by John Stoddard

Since taking over as Legislative Adviser, John has had a monthly column in AKF keeping the membership abreast of current and pending legislation affecting zoos and exotic animals. He has also included information on federal agencies, international treaties, AAZPA policies and position statements, etc. After a meeting with Ed Schmitt, chair of the AAZPA Legislative Committee, John was added to their mailing list and also appointed AAZK Liaison to the AAZPA Legislative Committee. In his annual report John encouraged the Board to have AAZK and its members become more actively involved in providing input on pending legislation and regulation changes. A budget of \$100 was approved - \$75.00 for subscriptions to needed legislative publications and \$25.00 for postage and photocopying costs.

Staff Exchange - report submitted by Elandra Aum

Begun six years ago, the Staff Exchange Project has compiled an access list of institutions (now totaling 71) interested in participating in exchanges. Elandra noted that it had been a disappointment that she had not gotten more feedback on whether exchanges were actually taking place. The Board stated that while AAZK can serve as an information source for zoos seeking to do exchanges, it cannot serve as a facilitator since situations vary so much from institution to institution. It was decided to maintain the access list on the computer at AAZK Administrative Offices and zoos interested in pursuing exchanges could contact them for information. Once the information is provided it will be up to the two institutions to work out the details of any exchange (salary, benefits, time length etc.) Elandra has tendered her resignation from this project and Cynthia Simpson, Brookfield Zoo, will take over as coordinator and will be responsible for updating the access list annually. Elandra will remain available to offer support and information to the new chair. A budget of \$200.00 was approved to cover the expenses of mailing update forms, postage, etc.

Keeper Accommodations List - report submitted by Heidi Manicki

This is the eighth year of this project which provides traveling keepers with contacts at zoological facilities throughout North America. Some groundwork has also been done in establishing KAL contacts in foreign countries. While Heidi will remain as coordinator for KAL and work at keeping the list updated, the list itself will be maintained on computer at the Administrative Offices and those wishing contact names should inquire there. There are currently 61 contacts on the list and more will soon be added. A budget of \$50.00 was approved.

Overview of 1988 Board of Directors Meeting, Continued

Animal Data Transfer Form - report submitted by Bernie Feldman

This popular and useful AAZK project was begun in 1977 and has proven its value by the increasing number of zoological facilities now utilizing the form. During the past year the form was reprinted each quarter to supply the demand. The ADT Forms are provided free to all zoological facilities as a service of AAZK. Currently there are approximately 130 zoological parks, aquariums, and other animal facilities using the form and the list is growing. This year efforts will be made to encourage all facilities involved in SSP programs to use the form as well as having Studbook keepers encourage their use. It is the long-range goal of AAZK that eventually no animal will be shipped without this important and information-rich form. A budget of \$800.00 was approved for 1989 to cover ADT Form printing and distribution costs.

Exhibit Design Form - no report submitted

Since its inception this project has been headquartered at the Akron Zoo under the chair of Diane Forsyth. During the past year it has been inactive and attempts to receive an update have been unanswered. The Board has advised Diane that Mark de Denus of Assiniboine Park Zoo is interested in working on the project and has asked her to forward materials to him. No further information was available at the time of the conference, but a report should be ready by the mid-year meeting. A tentative budget of \$100.00 was approved providing the project becomes active again.

Zoo/University Project - report submitted by Mike Illig

Mike has spent the past year since assuming chairmanship of the project entering the initial list on computer, making additions and updating. This list provides the names of 97 colleges and universities across the country which offer academic courses relevant to the zookeeping profession. Mike plans to send out form letters to all listed institutions this year to update their currently listed information. A copy of the list is available from AAZK Administrative Offices by sending a stamped (45 cents), self-addressed business-sized envelope. The Portland AAZK Chapter has thus far generously absorbed the costs of this project. In anticipation of a major mailing to update the list in 1989 a budget of \$100.00 was approved.

Consortium of Zoos, Aquariums & Universities (CAUZ) - report submitted by Donna Fitzroy-Hardy

To date, AAZK participation in CAUZ has been as a liaison. The consortium was established to bring together researchers in the three areas who have similar interests. CAUZ membership now total approximately 400 members from the following areas : 52% zoological parks, 3.8% aquariums, 29.5% universities and 14.6% institutes, etc. They have published a Directory cross-referencing individuals and fields of research interest. It is available for a \$10 donation from: Donna Fitzroy-Hardy, PhD., Dept. of Psychology, California State University, Northridge, 18111 Nordhoff St, Northridge, CA 91330. Checks should be made payable to "C.S.U.N. Trust Fund".

An Approach to Zookeeping - report submitted by Pat Sammarco

Begun in 1983, this project is still working towards completion. While the text was originally conceived as a single entity project, the amount of time it has taken to complete the various sections has gone beyond the time frame originally established. The Board has therefore suggested that the text be broken down into individual publications, beginning

Overview of 1988 Board of Directors Meeting, Continued

with the Basic Concepts, progressing through the various chapters (i.e. Hoofstock, Reptiles, etc.). As they see how the project progresses in the coming year, further decisions will be made on how it will be published. Outside funding will most likely be necessary to achieve publication whether in unit or entity form. Some sections have not as yet been assigned editors and this work must be completed before a final decision is made. The Board hopes to have a more updated report by the mid-year meeting. A budget of \$50 was approved

AAZK Keeper Training Video Tape Project - report submitted by Judie Steenberg

This project was conceived in 1982 and began under the auspices of the Keeper Education Committee. B. Wayne Buchanan devised and implemented the project which is now self-supporting and independent of the KEC. Judie assumed chair on 1 January 1988. Two videotapes are currently available: Zoo Keeper Safety: an Attitude Adjustment and An Introduction to Feeds and Feeding. To date 115 copies of the safety tape and 100 copies of the feeds tape have been sold. Seventy-nine institutions/individuals have both tapes. Tapes have been sent to seven countries outside the US/Canada/Central America. Work on The Keeper's Role in Zoo Animal Health is progressing. A videotape on How to Make a Videotape was produced at the AAZK Conference in Winnipeg and is currently being duplicated. A workshop on Training Videotapes was held at the Tucson Conference to offer encouragement and how-to information to those interested in producing training tapes. Judie wishes to acknowledge the contribution of the Safeco Insurance Co. of Seattle who has duplicated nearly 200 tapes for AAZK at no charge to the Association.

Due to her commitment to complete the Keeper's Role in Zoo Animal Health series of training tapes, Judie has asked that a new coordinator and location be found for the project. She will, however, remain a member of the Committee. She will remain as chair until 1 Jan. 1989. Marilyn Cole has agreed to chair the project, but because of concerns with the currency exchange differential between Canada and the U.S., the project will remain for the time being at Seattle. Marilyn will check into any possible problems with basing the project in Canada and report back to the Board. Since this is a self-supporting project no budget was requested.

Keeper Training Materials Identification Project - report submitted by Rosemary Jalink

The purpose of the KTMIIP is to aid zoos or individuals in devising a training program for their keepers, or to help refine an existing training program by offering various materials. Phase 1 involves gathering a list of manuals pertinent to keeper training and making them available. The list of Training Manuals available is published periodically in AKF. Coordinator for the manual portion of the project is Laura Trechsel of the Minnesota Zoo. A total of 794 manuals and other materials were sent during 1988 to zoos and individuals in the U.S., Canada and Japan. Phase 2 of the project involves compiling a list of videotapes on keeper training and where they may be obtained. Rosemary is coordinator for this phase of the project. Rosemary has put together a sample catalogue listing the manuals and videotapes available. This catalogue give information such as: source of material, whether it can be purchased, rented or is gratis; where to order the materials, etc. When completed this catalogue would be made available to zoo's training officers, at zoological conferences, and to members. Rosemary suggested that AAZK may want to charge a nominal fee for the catalogue to cover costs. She also stated that perhaps a handling "surcharge" should be added to the cost of ordering reprints of manuals as currently they are distributed on a cost-only basis. This would provide some "seed" money to keep the project rolling. It will need to be determined whether such a "surcharge" would be in violation of the nonprofit status we are seeking for AAZK. A budget of \$200 was requested and approved.

Overview of 1988 Board of Directors Meeting, Continued

Program Library - report submitted orally by Debbie Jackson

After assuming chair of this committee, Debbie was frustrated by the inability to retrieve the materials from the previous chair. The Program Library is made up primarily of slide presentations which may be loaned to chapters for programs, etc. She announced at the Board meeting that the Program Library has finally been retrieved. She is now in the process of reviewing the materials available to make a recommendation to the Board as to how the project should proceed. Until that determination is made, no budget was requested.

AAZK Accessories

AAZK Logo Coffee Mugs - report by Carol Boyd: the mugs were first made available by the Milwaukee County Zoo AAZK Chapter in May of 1986 and the first order of 141 mugs was sold out in November 1986. The second order of mugs was received in September 1986 and to date only 48 have been sold. 96 mugs remain in inventory. The mugs sell for \$5.50 each which includes postage. 29 more mugs need to be sold in order to realize a profit on the second order.

AAZK Belt Buckles - report by Terri Schuermann: the project was begun in 1985 and revitalized with the San Diego Chapter in 1986. The product is a high-quality brass buckle available in two sizes and features the AAZK rhino logo. At the conference, Terri reported that interest in continuing the project has waned and that she is seeking another chapter that would be willing to take it over. This would involve "buying out" any existing inventory from the San Diego Chapter. (The initial start-up expense of producing a tool die have already been paid for by San Diego.) Terri can provide any interested chapter with information on how to order the buckles. Sales of the larger size buckles have been good, but the smaller ones have not sold as well despite interest expressed in them by delegates at the Winnipeg conference. The buckles were available for sale at Tucson, so the remaining inventory is left is unknown at this time. Any interested chapters should contact Terri at the San Diego Wild Animal Park.

AAZK License Plates: this project was originally undertaken by the Detroit Zoo AAZK Chapter, but since no report was submitted in 1988 its status is unknown at present. It was suggested that if this information could be obtained and the Detroit Chapter was no longer interested in maintaining the project, it could be offered to another chapter or possibly sold through AAZK Administrative Offices. This will be checked into and hopefully a decision can be made by the mid-year meeting.

AAZK Logo Stickers - report by Rosemary Jalink: stickers in two sizes featuring the AAZK rhino logo are available from the Mill Mountain AAZK Chapter. Total sticker income from October 1987 to July 1988 were \$112.75. The Chapter now is offering auto decals for sale. Watch the *AKF* for information and an order form.

AAZK Logo T-Shirts - report by Marie Schmude: The Little Rock Chapter offers AAZK logo T-shirts in Blue, Tan or Brown for \$7.00 each. They now also offer gray AAZK logo sweatshirts at \$18.00 each which includes postage and handling. The Chapter also received permission from the Board to market Can Coolers featuring the AAZK logo for \$3.50 each. These products may be ordered from the Little Rock Chapter.

Keeper Care Buttons: Board member Bob Debets who has oversight for this project will check into whether the Lincoln Park keepers are still interested in maintaining this project. During the past two years there have been difficulties in orders not being processed. If they are not interested in keeping the project, it may be offered to another chapter or taken to the AAZK Administrative Offices. Rosemary Jalink of Mill Mountain Chapter expressed some interest in this project.

Overview of 1988 Board of Directors Meeting, *Continued*

Other Proposals Brought Before the Board

1. Carol Boyd of the Milwaukee County Zoo AAZK Chapter requested Board approval for the sale of egg ornaments featuring hand-painted AAZK logos at the Tucson Conference. They would be sold only at the conference and would cost \$15.00. A special conference egg, featuring not only the logo but the inscription "14th National AAZK Conference, Sept. 11-15, 1988, Tucson, Arizona" would be donated by the Chapter for the Live Auction. The Board approved this proposal.

2. Eileen Gallagher of the Association of Zoo Veterinary Technicians presented in writing the following: It was proposed that beginning in 1991 the AZVT would hold their annual meeting on the Saturday and Sunday prior to the annual national AAZK conference at a common site. This would allow their group to take advantage of lower hotel rates secured by our larger meeting and also allow those vet technicians able to attend a portion or all of the AAZK conference. The possibility of joint paper sessions was also discussed. The Board approved this proposal and directed Eileen to have her group work with the 1991 conference chairman and committee to arrange details.

Minutes of the 1988 AAZK General Membership Meeting

The meeting was called to order on 15 September, 1988 at 1:45 p.m. by President Frank B. Kohn. Frank gave a report on the status of the Association and each Board Member gave a brief report on the committees/projects under their oversight with chairpersons present at the meeting adding pertinent comments.

One of the primary items of attention at this meeting was the vote on the revisions of AAZK's By-laws. President Frank Kohn reviewed the revised Statement of Purpose, the proposed amendments to the Articles of Incorporation and asked for comments and suggestions on the proposed By-law revisions. The following suggestions (in *italics*) were proposed and incorporated into the By-law revisions:

Article II, Section 7d, International shall now read: "Any member living outside the *United States and Canada* and who may be fall into..."

Article II, Section 7f, Contributing shall now read: "Any organization or individual who wishes to contribute the sum of Fifty Dollars (\$50.00) *or more...*"

Article IV, Section 1i, Meetings shall now read: "...for a majority to be in attendance *in person...or similar communications method...*"

Article IV, Section 2, Conferences shall now read: "The bidding shall take place at an annual conference at *least* two years...bids for such regional conferences must be made *at least* one year prior..."

Article V, Section 13 shall now read: "...shall constitute a legitimate expense, the *Treasurer and Board of Directors* is hereby authorized to accept or reject such expense..."

The proposed revisions in the By-laws were moved for passage by Carol Boyd and seconded by Jan McCoy. The proposed By-law revisions were passed by a unanimous vote of the delegates in attendance at the General Membership Meeting.

A bid to host the 16th National AAZK Conference was presented by the Audubon Park Zoo AAZK Chapter, New Orleans, LA. The assembled delegates unanimously voted to accept their bid to host the conference in 1990.

There being no further business, the meeting was adjourned at 3:35 p.m. to reconvene in Syracuse in 1989.



Endangered Species Act Receives Congressional Reauthorization

The reauthorization of the 1973 Endangered Species Act has at last emerged from the halls of Congress - overhauled and strong.

On 11 October, the Act was signed by the president, marking a legislative milestone that will breathe life into under-funded and under-staffed endangered species programs.

Since December, when the House overwhelmingly passed its version of the Act, conservationists have been rallying forces to combat opposition from western and southern senators. After months of negotiations among the different camps, environmentally acceptable compromises on several controversial issues were crafted. In the end, the refurbished Act represents a victory for conservationists and a congressional commitment to the restoration of endangered species.

John Ernst, the National Wildlife Federation's wildlife legislative representative, applauds the Act. "The National Wildlife Federation cheers the strong resolve of Congress in maintaining the integrity of this critical law. The House and Senate committees navigated the reauthorization bill through a torrent of special interest exemptions without seriously damaging the Act. Congress has reaffirmed its strong support for protection of all species."

Important Provisions of Endangered Species Act

- authorized funding for fiscal year 1989 set at about \$61 million (compared to \$29.2 million for fiscal year 1987)
- authorized funding increased 17 percent over the next four years
- fines raised for violations of the law
- federal government required to monitor more closely about 1,000 potentially endangered plants and animals
- new protection added for endangered plants

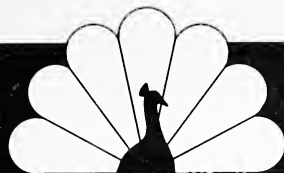
The main obstacle to the Act was controversy in the Senate concerning Turtle Excluder Devices (TEDs). The reauthorized Act delays implementation of a regulation requiring shrimpers to use TEDs.

(The above was reprinted from Conservation 88, the Exclusive Newsletter of The Resource Conservation Alliance, National Wildlife Federation, Vol. 6, No. 14, Oct. 24, 1988.)



Correction

A correction needs to be made in reference to the Viewpoint article ("Eclectic vs. exclusionary - revisited) which appeared in the October 1988 *AKF* on page 316. Dr. Kevin T. Patton, the author, was incorrectly listed as affiliated with certain institutions. The author's credits should have read: Chair, Division of Math Science & Applied Technology, St. Charles Community College (MO) not St. Charles County College (MO) and Undergraduate course supervisor, Dept. of Physiology at St. Louis University (M) not at St. Louis Community College (MO). We apologize for this error and hope it has not caused any confusion or inconvenience.



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"Chanda" - Canada's First Asian Elephant (*Elephas maximus*)

By
Pam McDougall, Elephant Keeper
Calgary Zoo, Calgary, Alberta, Canada

The Calgary Zoo's three adult Asian elephants (*Elephas maximus*) were handpicked from an elephant orphanage in Sri Lanka in 1976. Before leaving for Sri Lanka, it was decided that the Calgary Zoo would establish a breeding herd of Sri Lankan elephants which are a subspecies of the Asian elephant. Peter Karsten, our zoo director, and Darrell Florence, the veterinarian at the time, chose one male, Bandara, and two females, Kamala and Swarna. All three were between six months to one year of age when they arrived in Calgary. My partner, Bob Kam, was one of the keepers responsible for the initial bottle feeding and training. He has remained on the elephant's section ever since.

The breeding part of our program started in February, 1984, eight years after the arrival of Bandara, Kamala and Swarna. By then, Bandara had successfully bred Kamala numerous times but we finally saw viable sperm in the ejaculate samples. Counting back from Chanda's birthdate, we believe conception occurred between 19-31 October, 1984. Bandara and Kamala were approximately nine years old. The pregnancy went relatively smoothly although a few out-of-the-ordinary events occurred. Firstly, on 9 February, 1985, four months into the pregnancy, Kamala passed a thick white mucous-type substance. The analysis was possible amniotic tissue. A possible abortion or the loss of a twin fetus were two thoughts that crossed our minds, but it now appears that our fears were needless. Secondly, Kamala's weight gain followed an unexpected pattern. At conception she weighed 2000 kg (4400 lbs). Over the next fifteen months she gained approximately 40 kg (88 lbs) per month to a weight of 2550 kg (5600 lbs) in January, 1986. In the following eight months before parturition, Kamala gained only 50 kg (110 lbs) in total. When her weight gain first leveled off, we started to watch her more closely for other signs of 'impending birth'. Anyone having experience with waiting for an animal's birth can appreciate the anticipation we went through, but with a 20 1/2 to 22 month gestation and 75 possible conception dates, we had to be extra patient!

We were still putting both females through a daily workout involving stretching, lifting and pulling. The 'aerobics' part was slightly modified for Kamala such that she did not have to do a hind leg stand. The first physical sign, other than the bulge at her sides, was the development of 'goose-egg' sized lumps in her breasts. This occurred five months after conception. As the months passed, Kamala's breasts enlarged and softened. We also got confirmation of her pregnancy through the results of weekly blood tests. Kamala's personality did not change much but we did notice a modified sleeping pattern. She began to sleep mainly on her left side whereas previously the time was pretty equally divided between right and left sides. Her sleeping time decreased from an average of five hours per night to only 45 minutes the night before she gave birth. Swarna, the other female, was totally unaffected, sleeping an average of four hours per night.

On Sunday, 10 August, 1986 at 0800 hours, Kamala passed approximately one liter of a mucous substance. The time was finally here! We now expected a birth within 36 to 48 hours. Sunday, however, passed relatively quietly. Kamala was spotting mucous and her breasts started to drip milk. She still participated in our elephant encounter program where the public meet and touch the elephants plus her 'modified' afternoon workout. Late Sunday Kamala started showing some discomfort and straining. She was monitored closely all evening but nothing developed. Until 1600 hours, Monday was also quite uneventful with another encounter and workout. Kamala was straining again and the mucous now had blood streaks. We set up a 24-hour schedule and I drew the first shift.

'Chanda' - Canada's First Asian Elephant, Continued

Around 1900 hours Kamala was straining alot and more blood was present in the mucous. I made a call to the foreman, Terry McDonald, for a second opinion as to whether we should notify everyone else. Terry agreed to come down but as I returned to Kamala, I noticed a bulge under her tail! After a quick call back to Terry to alert the others, I began my pacing. We had previously discussed our plans but being very junior and totally inexperienced with elephant births, I was wishing everyone would hurry up. Finally, at 2030 hours everyone showed up almost at the same time. We had the two elephant keepers plus myself, the veterinarian, the animal health technician, the foreman, the curator of animal collections and even the director a little while later. It was obviously a very momentous occasion!

The bulge continued to move slowly downward. At one point the veterinarian, Dr. Sue Mainka, reached up and touched the pads of the hind feet. The tension was mounting! At 2100 hours, we chained the females in their regular positions. Since this was a first for all of us, including Kamala, we felt we would have greater control with both females in leg chains. Kamala and Swarna remained very calm up until the actual birth. Kamala's heavy labor, involving crouching down and lifting her hind legs, began about 2145 hours. The amniotic sac first appeared at 2245 but remained intact until the calf was born at 2255 hours. When the sac broke, the elephants both trumpeted alot and were quite nervous. As planned, but with some degree of difficulty, we took the calf away to check him out. We were glad to have chained the females who quickly calmed down, but wished we had put shavings down to absorb some of the liquid. It was immediately evident the calf was healthy and it was a male. He attempted to stand right away but could not get any good footing. Once we dried him and the floor off somewhat, he stood on his own. We decided to give him to Kamala. Everything was fine until the calf slipped and roared. For a few moments we thought Kamala was trying to step on him. Very quickly we realized she was just using her hind feet to try to move him towards her head. It was quite tense until Kamala had him protected. At this point we were relieved when Kamala still allowed us to approach her and the calf. Then when the calf figured out how and where to nurse, we all heaved a sign and congratulated ourselves. It was 0120 - 2 hours and 25 minutes post-parturition. The whole birthing had gone relatively easily except for a slight vaginal infection that flared up later due to the calf's feet staying in one place too long. We were all quite filthy and exhausted, but very happy. The calf was healthy and Kamala was a good mother.

That was the start of 'Chanda', which means 'mischievous one' in Sri Lankan. The first few days were alot of fun. We managed to weigh Chanda and Kamala. Chanda weighed 138 kg (303 lbs) and Kamala had dropped 300 kg to 2300 kg (5060 lbs). All were doing well. Watching Chanda learn how to handle his trunk was quite entertaining. He also had a problem because of Kamala's pacing habit. He had to exercise his lungs whenever he wanted a drink. In fact we had to chain Kamala for parts of the day to allow her and Chanda to rest. We also chained the females at night. Chanda lost a few kilograms during the first few days of pacing but from that point until weaning he went from 138 kg to 800 kg in nineteen months. That is an average gain of 0.86 kg (1.89 lbs) per day. He was a very precious little boy. One setback did occur with Kamala when Chanda was 24 days old. She became very sick, lost all coordination in her trunk, could barely stand and even fell down briefly at one point. It came on very quickly on a Thursday. Kamala had to be hand-fed; she was shaking and exhibiting head-pressing behavior. We gave her various forms of therapy including intravenous calcium, sugar, vitamins, bonemeal tablets and Banamine®. We do not know what the cause was but suspect it was a neurological virus. Kamala recovered relatively fast although it took awhile for total control of her trunk to return. Chanda continued to nurse and gain weight.

Chanda was first on view to the public when he was three days old. We took the three elephants into their outside yard where we were greeted by a crowd of hundreds of Calgarians who had waited a long time for the blessed event as well. The following week we took Chanda out onto a grassy area for the press to get some good pictures. He put on quite a show, rolling in the grass, trying to eat some of it. In fact he became so preoccupied with the grass that he looked up and saw no familiar gray legs. He roared and chased the photographers closest to him. After that, however, he stayed fairly close to Kamala and Swarna.

'Chanda' - Canada's First Asian Elephant. *Continued*

Chanda's first training started in January, 1987. The fun was about to begin! He was five months old and already weighed 323 kg (710 lbs). We attempted to get leg chains on him, working with him while the females were chained in their normal positions. Eventually we did get him chained but our chains were breaking or biting in or slipping off. The females were quite upset and getting in the way so we decided to wait awhile longer for the chains and to work on a few simple verbal commands. 'Trunk up', 'lead out', 'foot', 'tail up' and 'steady' were initiated. We achieved moderate success but still had no effective method of restraint. If Chanda wanted to obey, he did; if Chanda chose not to obey, he did not. We also tried to develop a rapport with Chanda aside from working with him. This proved very difficult with Kamala at his side providing all the essentials - food, love and protection. It was six months of alternating rewards and frustrations. That summer, however, the females and Chanda participated in our two elephant programs. Chanda generally stayed back during the elephant encounter, but people were happy just to see him that close. The afternoon workout was replaced with an interpretative talk on Chanda's development and relative importance in the world. In September, after the programs ended, we tried a new angle for introducing Chanda to leg chains. We created bracelets to put around his front ankles and on his hind legs. With some degree of success we were able to chain and unchain Chanda, but we still had trouble keeping the chains in place, especially the hind leg ones.

In mid-October, since John Lehnhardt, one of our full-time trainers, was leaving for Washington, DC, we made the decision to get into Chanda's training in earnest. We started with the command to 'stretch'. Using a combination of ropes, chains and a winch, Chanda learned the command. He was very stubborn, taking eight hours to submit to what his father learned in 15 minutes! After a week of practicing to stretch, we moved on to 'come down'. Here we ran into special difficulties and eventually had to separate Chanda from the females. A rope harness and winch helped with the 'come down' lesson which was even tougher than the 'stretch' lesson. By mid-November however, Chanda was able to figure out how to lay down on the other side with just an elephant hook and verbal commands. He had now been separated from Kamala for three weeks which seemed to have directed his attention toward us. Kamala had dried up, or so we thought and we put Chanda back. Immediately Kamala began to produce milk and we lost what little ground we had gained with Chanda. We had hoped she would stay dry so Chanda would at least develop a reliance on us for food. Working Chanda into the females' routine was easy except when we asked him to do something on his own without the females at his sides. After three months of trying to work out the problems, we felt we were falling behind rather than getting ahead. Also, since we have only one keeper on six out of seven days, we had a safety factor to consider. It was time to wean Chanda!

It was now mid-March; Chanda was 19 months old, stood 146 cm (4' 9 1/2") at the shoulder and weighed 800 kg (1760 lbs). At least now we could concentrate solely on Chanda without having to check on and discipline the females. Since March, we have had a lot of ups and downs. Chanda still has unpredictable moods. He is definitely the offspring of his stubborn, aggressive father and his intelligent but testy mother. He is continually challenging us. The hardest part of his training has been working him from a distance by verbal commands without the use of a hook. A combination of love, treats, leg chains, hobbles and even a small hotshot have been used. Regardless of our methods, Chanda continues to have his mellow days, even weeks, and then resistive days or weeks. This summer, however, we had very successful elephant encounters with Chanda by himself. It was explained to concerned zoo visitors that his separation from Kamala was necessary for the successful training. During the encounters he was generally meek and mild. The public still refer to him as 'cute and cuddly' unless they see one of his tantrums or hear him roar. Our goals for future training include putting Chanda back with the females while maintaining control over all three elephants.

Although he is a handful, Chanda is an important bull elephant. The Calgary Zoo is proud to take credit for the first successful breeding and birth of an Asian elephant in Canada and a Sri Lankan elephant outside of Sri Lanka. In addition, Bandara and Chanda are the only two Sri Lankan bulls in North America. This is only important, however, if the Asian

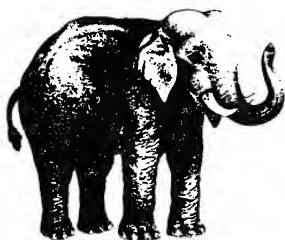
'Chanda' - Canada's First Asian Elephant, *Continued*

Elephant Species Survival Plan recognizes Sri Lankan elephants as a separate subspecies. The topic is still under discussion.

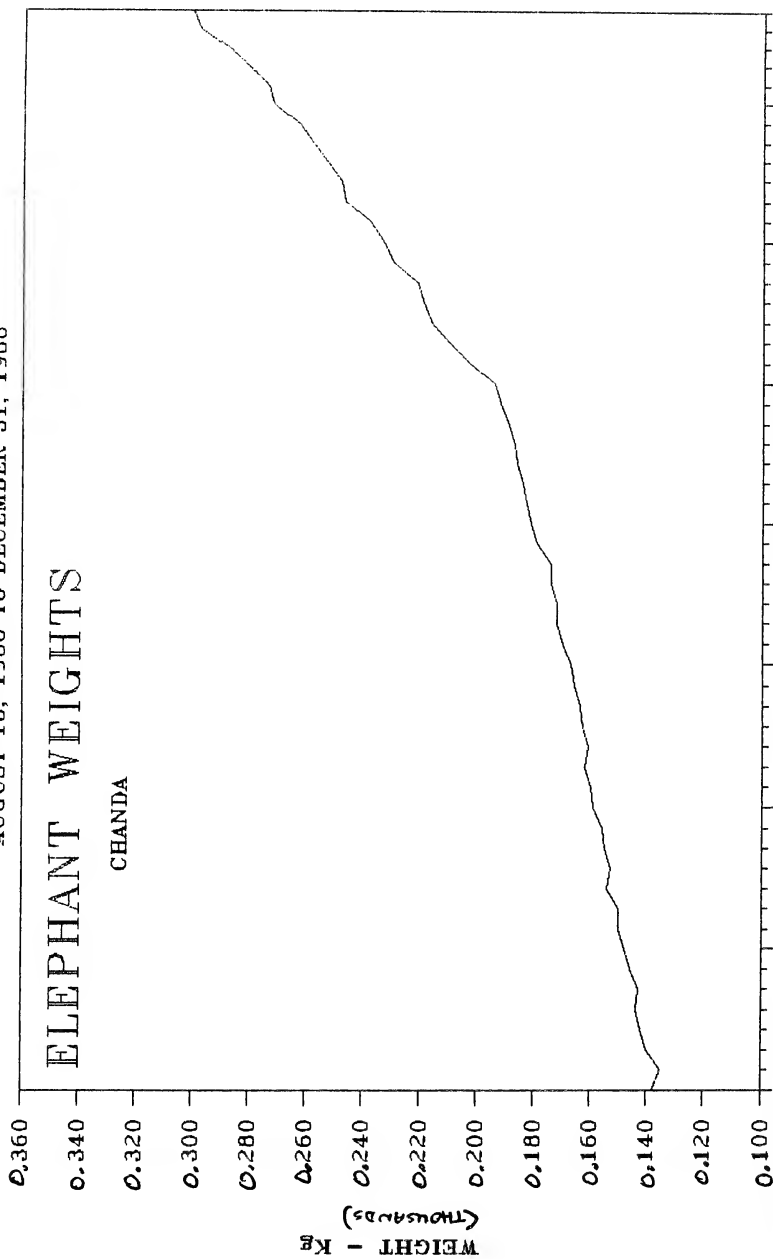
Overall, Chanda has proven to be a real challenge. He now stands 160 cm (5' 3") and weight 850 kg (1870 lbs). (Fortunately for us his weaning and training slowed his growth rate). Although he is not always consistent, we are thankful that Chanda has not shown any aggressiveness towards us. We have learned alot through his birth and training. Very likely we will chart his progress for a few years until another zoo is ready to provide a breeding bull facility. Any takers?

Chanda's Firsts

stood up alone	45 minutes
nursed well	2 1/2 days
outside - no public	2 days
- public viewing	3 days
-on the grass	17 days
drinking water with his trunk	9 days
putting food into his mouth	11 days
all four molars through gums	12 days
vegetable matter in stool	19 days
tusks - felt under gums	20 months
- through gums - left	23 months
- through gums - right	24 months



AUGUST 13, 1986 TO DECEMBER 31, 1986

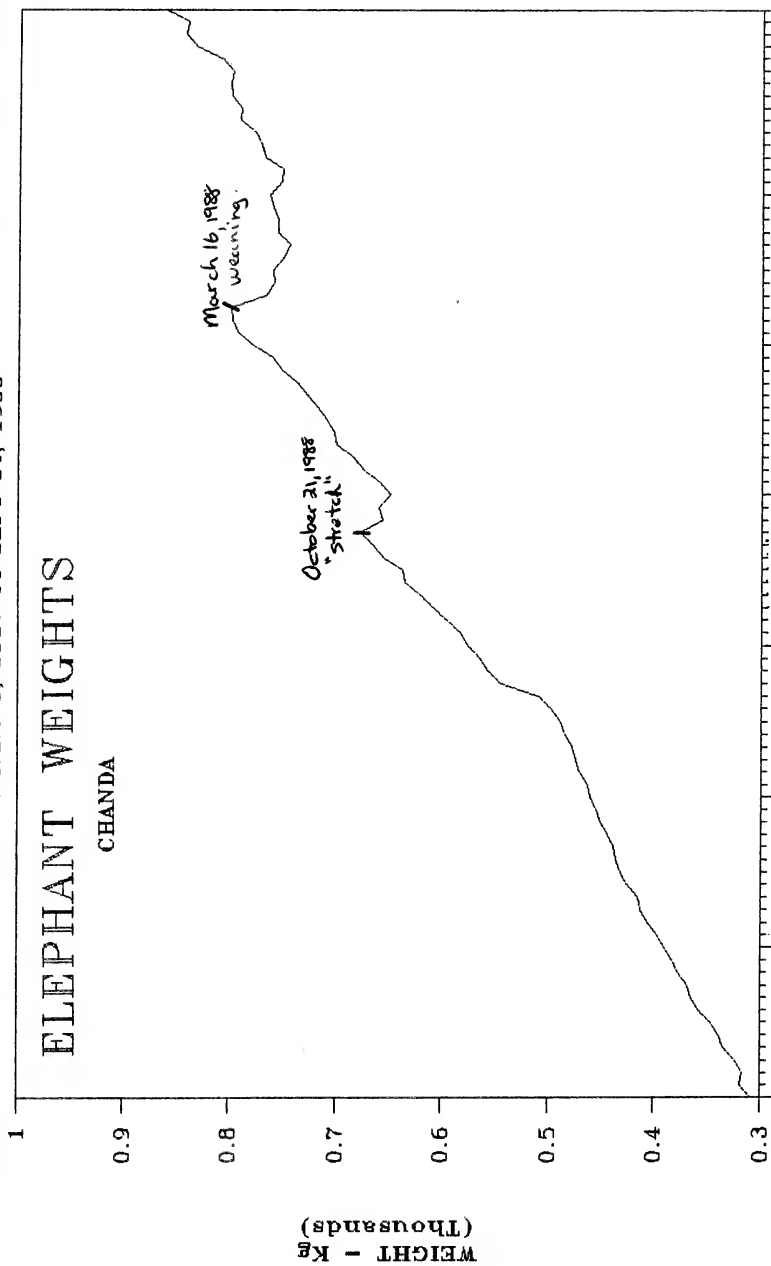


DATE 13-Aug-86 22-Aug-86 29-Sep-86 06-Sep-86 16-Sep-86 27-Sep-86 30-Oct-86 03-Dec-86

JANUARY 8, 1987 TO SEPT 14, 1988

ELEPHANT WEIGHTS

CHANDA



DATE 08-JAN-87 26-MAR-87 20-MAY-87 12-AUG-87 18-NOV-87 24-FEB-88 18-MAY-88 24-AUG-88



Chapter News

Los Angeles AAZK Chapter

On 6 October, the Los Angeles Zoo AAZK Chapter held its big fundraiser: an auction of zoo memorabilia. We held both a silent and a live auction, with over 250 items being sold. Our total at the end of the evening was almost \$3,000, including \$420.00 for our friends at Moonridge Zoo. We wish to thank the many people who donated items (including Washington Park AAZK, Little Rock AAZK, and Art Goodrich of the San Diego Zoo) as well as those who arranged, displayed, cataloged and bought. A very special thanks goes to Dennis Thurslund, one of our reptile keepers, who was out auctioneer. Dennis kept the auction moving smoothly and expertly, while interjecting his own brand of humor. As always, everyone had fun and almost everyone went home with some "new treasures".

--Kim Brinkley
Chapter Liaison

Fresno Zoo AAZK Chapter

On 28 September, 1988, the Fresno Zoo AAZK Chapter celebrated its 10th anniversary of its Chapter with a luncheon at the Zoo for all staff members. The luncheon was paid for by the proceeds from the recycling of aluminum cans which has netted the Chapter over \$150 since April.

With the monies generated from T-shirt and gift shop sales, the Chapter is in the process of joining several conservation organizations.

Sales from the Chapter's Coke® machine have generated over \$500 for the Chapter's book fund and we will be purchasing much needed books for staff use in the near future.

Chapter President Mary Morgan was recognized by the City of Fresno's Parks and Recreation Dept. as Employee of the Quarter in May.

--David Luce
Chapter Liaison

Zoo Atlanta AAZK Chapter

Zoo Atlanta AAZK recently revised our Chapter logo, designed by reptile keepers Sue Barnard and Brian Williams. The logo is a negative (black & white image) of a Morelets crocodile and a Lowland gorilla. The Morelets crocodile represents Zoo Atlanta's past successes, our commitment to reptile husbandry, especially with endangered species like Morelets crocodile of which we have a successful breeding group.

The Lowland gorilla represents our future goals, commitment to the breeding of Great Apes and our massive redevelopment plans now underway.

We recently completed our Halloween Haunted House fundraiser and made a profit of \$619.00! We had 1200 very scared and satisfied patrons in a four-hour period.

Zoo Atlanta's resident animal dentist, Dr. Laura Braswell, DDS, gave a presentation on zoo dentistry and Ellen Bradfield, primate keeper, gave a presentation on her recent trip to Indonesia at our Biology Seminars.

--Tim Kurkowski
Co-vice president



Chapter News. *Continued*

Smoky Mountain AAZK Chapter

Newly elected officers for the Chapter (located at Knoxville Zoological Park, TN) are:

President.....Teresa Kinsler
Co-President.....Midgie McGill
Vice President.....Cathy Scott
Secretary.....Sharon Adams
Treasurer.....Carol Newsom
Liaison Coordinator.....Midgie McGill
Regional Liaisons.....Vicki Roose
Midgie McGill
National Liaison.....Susan Ilgner

With the election of officers, the Smoky Mountain Chapter has begun its second year. Our first year has definitely been a learning experience and in many ways rewarding for all of us. We have met with many challenges and we feel we have made some significant accomplishments.

Our on-going project to recycle waste cardboard from our Zoo grounds contributes to our conservation cause and saves the Zoo the expense of discarding.

Members of our chapter have visited local school children and have given talks in our community as to the purpose of zoos and their work as keepers.

We have designed a Chapter logo (see insert) and have had this design printed on T-shirts which we are now selling. The design was drawn by one of our members, Brynn Harrison Jones. The T-shirts are yellow with the design in black with the wording "Smoky Mountain Chapter, American Association of Zookeepers". If anyone is interested in buying a shirt, the cost is \$8.00. We have sizes small, large and X-large (sorry, no mediums left!). Send payment and sizes to: Midgie McGill, Knoxville Zoo, P.O. Box 6040, Knoxville, TN 37914. Makes checks payable to "Smoky Mountain Chapter".

Our Chapter has contributed \$100.00 to World Wildlife Fund and participated in our local public television station's campaign for funding.

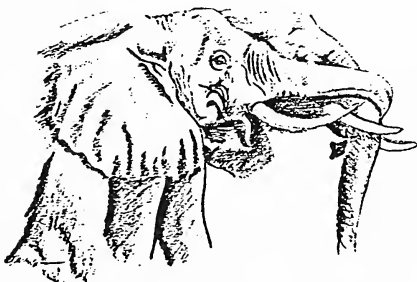
We sponsored a "Zoo Parents" contest, took part in special events at our Zoo,

working on a keepers' lounge, sponsored trips to Toledo Zoo and Asheboro and organized informative monthly talks given by our Knoxville Zoo staff.

And this year our chapter was represented at the AAZK Conference in Tucson by two of our members.

We are ready to start our second year and already have many new ideas for future projects! As we look ahead, we are also looking back to determine what problems we encountered and how they were dealt with. We feel it would be valuable to also ask other chapters what problems they have had and put all this information together to help all AAZK chapters. Putting together this booklet will be one of our first projects for the next year! We are all looking forward to our second year!

--Susan Ilgner
National Liaison



Audubon Park Zoo AAZK Chapter

We recently held a special election for a new vice-president. Michelle Bouvier now holds this position.

Four members of our chapter attended the National Conference in Tucson. After listening to the stories of all that's involved in putting on a conference, we put in our bid for the 1990 conference anyway! We won the bid (though competition was tough) and brought the good news home. We're now busy selecting chairpersons and sorting out committees.

--Carolyn Kennedy
Chapter Liaison

Chapter News, Continued

Mt. Tahoma Chapter AAZK Tacoma, WA

In September we elected our officers for the following year. They are:

President.....Kit Niemann
Vice President.....Marcye Miller
Secretary.....Kristina Neeb
Treasurer.....Cindy Alia
Chapter Liaison.....Barbie Osborn
Project Coordinator.....Garrett Glodek
Reporter.....Margaret Gaspari

Also, with the help of our Pt. Defiance Zoo and Aquarium Zoo Society, we were able to send one of our members, Kit Neimann, to the National AAZK Conference in Tucson to receive the Excellence in Zookeeping Award. Kit is the first person in our Chapter to be honored in this way and we are really proud of her.

In November we hosted a regional workshop that included representatives from Woodland Park Zoo, Seattle; Washington Park Zoo, Portland; and Northwest Trek, Eatonville, WA, as well as visitors from Hogle Zoo, Salt Lake City, UT. A talk on the Red Wolf Conservation Program by Pt. Defiance Zoo's Assistant director, Roland Smith, began the evening. After a light supper, we had an evening of discussion about the conference, chapter events, problems and solutions, and directions for the future.

--Margaret Gaspari
Reporter

North Carolina Chapter AAZK

At our August meeting, an excellent slide presentation was given on the North Carolina Aquariums by Rhett White, Director of the North Carolina Aquarium at Roanoke Island. He described the education and conservation efforts of the three aquariums located on the North Carolina coast.

In September, a cookout and covered dish dinner was held at Lucy Segerson's home. The final draft of the keeper slide show was presented to the group for suggested changes. It is now being duplicated and will soon be ready to present to school and other groups.

Members have now received Chapter T-shirts which are being worn to AAZK functions. We have received many compliments on them.

In late September, the chapter received a letter of resignation from Lewis Green, Vice President. Lewis has accepted another position at Audubon Zoo in New Orleans. The chapter thanks Lewis for his work and encouragement and wishes him the best of luck in his new position. We will miss him!

--Luicy Segerson
Secretary

REMINDER: If your Chapter has not yet sent a copy of your Chapter logo for our file here at National Headquarters, we would appreciate it if you would do so. Having all Chapter logos on file is helpful when new Chapters are designing logos in order to avoid duplications.

Have any good photos? The AAZK Public Education Committee is looking for photo contributions to be used in the "Zookeeping As A Career" poster project. Photo submitted should show keepers working in the areas of Animal Care, Research, Conservation and Education. We need color photographs in 5" x 7" or 8" x 10" size, or send a negative with your regular size photo. Send photos to: Tom LaBarge, c/o Burnet Park Zoo, 500 Burnet Park Drive, Syracuse, NY 13204.





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Use of an Artificial Gum-Tree Feeder for Marmosets

By

Greg Peterson, Keeper

Kathy Kelly, Keeper Aide

Lee Miller, Volunteer, Friends of the National Zoo

National Zoological Park/Smithsonian Institution

Washington, DC

Introduction

Recently several researchers have published papers describing the use of gums and exudates from woody plants as a food source for several different animals (Coimbra-Filho, 1978; Garber, 1984; Moynihan, 1984; Hausfater, 1976; and Nash, 1986). The most recognized and documented of these animals feeding on gums (gummivory) occur in the callitrichid family. The *Callitrichidae* is a family of small South American primates popularly known as marmosets and tamarins. Taxonomists have separated the marmosets from tamarins partly based on their dentition, specifically the relative length of the incisors in the lower mandible compared to the canines. Marmosets (also referred to as short-tusked marmosets) have incisors that are about the same length as their canines, whereas in the tamarin (sometimes called long-tusked marmosets) the incisors are shorter than the canines. This difference is not merely a taxonomic point but rather is indicative of a difference in these animals' behavior.

Wild marmosets, especially the pygmy marmoset (*Cebuella pygmaea*) are known to gouge wells in woody plants and eat the exudates that pool in these wells. Wild tamarins are known to eat gums produced by plants resulting from mechanical or insect damage although they are not reported to gouge wells like the marmosets. The pygmy marmoset utilizes gums as a major portion of their natural diet, up to 70% in fact, while the rest of their diet appears to consist mostly of invertebrates.

Researchers at the University of Stirling, Scotland (McGrew, 1986) have published findings on the construction and use of an artificial gum-tree feeder for marmosets in captivity. Initially we attempted to duplicate this feeder, using a solution of gum arabic as the exudate, and through the use of volunteer behavior watchers from the Friends of the National Zoo (FONZ) monitor the effect this feeder had on the animals' behavior. As is often the case, a behavioral experiment with animals rarely, if ever, works the way the experimenters had planned. This paper chronicles the problems we encountered and the lessons learned in hopes of making a feeder that is both beneficial to the animals and practical for keepers to prepare without a large expenditure of time or money.

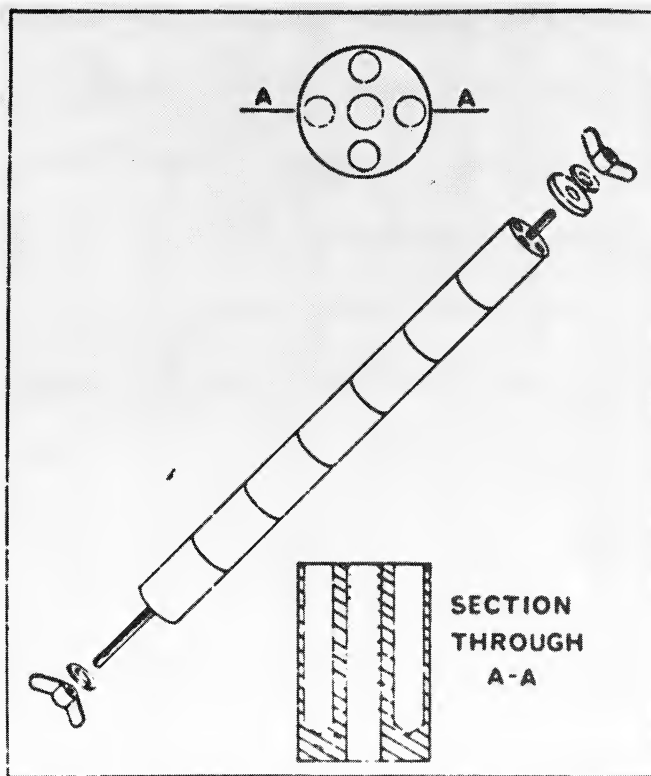
Experimental

The artificial feeders we constructed for this study (McGrew, 1986) consisted of wooden segments which were fabricated from 1 1/2-inch (3.8 cm) diameter wooden dowel stock with each segment consisting of a 2 3/4-inch (7 cm) long piece of dowel with four 3/8-inch (10 mm) diameter holes drilled 2 1/2-inch (6.4 cm) deep equidistant from each other around the edge and along the same axis as the dowel. The segments also have a 7/16-inch (11 mm) hole drilled through the center of the dowel so that the eight segments can be stacked on a 26-inch (66 cm) long by 1/4-inch (6 mm) diameter threaded steel rod and secured with wing nuts.

Even before we introduced these feeders to the animals we began to encounter problems with them. Our first concern was that the gum in the feeders would dry out too quickly and this was rapidly confirmed by placing some of the gum arabic solution in the feeder segments and monitoring how long the material remained liquid. The gum arabic solution dried to

Use of an Artificial Gum-Tree Feeder for Marmosets. *Continued*

a glass-like consistency in only two to three days. We then tried soaking the feeder segments prior to filling the segments. Even after soaking the segments for a week or two in gum arabic solution, the wood dried very rapidly. As a result of these observations the feeder segments were continually soaked until just prior to filing them and placing them in the exhibit.



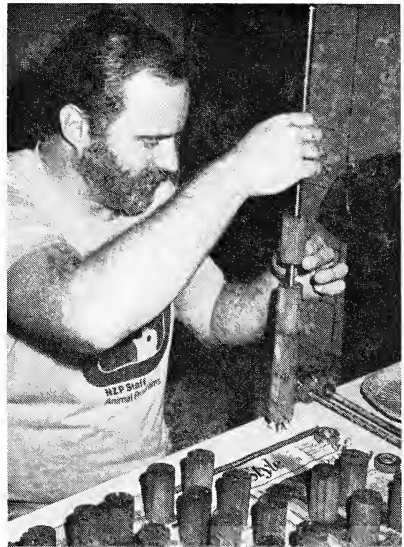
Drawing of the feeders as published in McGrew's (1986) paper from which we based the feeders used in this study. (Photo: Lee Miller)

The feeders were wired into the exhibit in a horizontal position with one end slightly raised to give the feeder a gentle slope. In this position two of the cavities were oriented to be on the top edge of the feeder and the remaining two on the bottom. Since the animals did very little gouging on the bottom surface of the feeders, and in an attempt to retard the wood and gum arabic from drying, the two cavities that were located along the bottom edge were filled with water. The two cavities oriented along the top edge were filled with the gum arabic solution.

The experiment was performed on a pair of pygmy marmosets and a pair of black-tailed marmosets (*Callithrix argentata melanura*). Both pairs of animals are housed on exhibit at the Small Mammal House of the National Zoo. These exhibits are designed to simulate a natural setting with concrete rockwork and settings combined with dead vines and tree limbs as well as some live plants.



Filling feeder segments with gum arabic solution using a syringe with a long needle to ensure filling the entire cavity from the bottom up. (Photo: Lee Miller)



Assembling the feeder by stacking the filled segments on the threaded rod. (Photo: Lee Miller)

In conjunction with this experiment we hoped to see a change in the activity level of the animals presented with these feeders. In order to monitor the animals' behavior a check-sheet was prepared. This check-sheet included general behaviors such as stationary, locomote, grooming, and eating non-exudate foods as well as not visible; along with behaviors specifically associated with gum feeding such as gouging wells, scent marking gouges, and eating exudate. Behaviors were recorded by the minute. These behavior watches were performed by some 45 FONZ volunteers with each of the volunteers observing each of the animals for one-half hour (a total of two hours per session) for a total of over 850 hours of observation time.

Results and Discussion

The first hurdle to overcome was convincing the marmosets that these feeders we placed in their enclosures were actually of value to them. This required some learning on the animals' part since at the end of the first week very little gouging had been done. Since these animals had never obtained gum from the wood in their exhibit there was no reason to expect them to immediately gouge the feeders and eat the gum. Therefore, after the first week with the feeders in the exhibit we replaced them with new feeders which had thinned walls and a generous supply of gum arabic spread on the outside of the feeders. This introduced the animals to the gum and they rapidly accepted this as a desirable food. It should be noted that especially with our black-tailed marmosets the animals took such a liking to the gum that before the end of the experiment they would fight over it.

Gouging damage to the feeders increased in succeeding weeks with the animals acting excited, especially the black-tailed marmosets, with the removal and replacement of the feeders. However, it became increasingly obvious that these feeders were too time consuming to use routinely. The soaking of the feeder segments did not create a time problem but the time required to prepare the gum arabic solution and fill the feeders was quite considerable (about two hours to fill the four feeders being used). This did not even address the time required for the construction of the feeders, which did not take keeper time,

Use of an Artificial Gum-Tree Feeder for Marmosets, Continued

since it was done in the zoo's carpentry shop, although this was probably considerable. It was clear that for a gum feeder to be usable on a regular routine basis, an easier and less time consuming feeder needed to be constructed. We also realized that keepers at some zoos may not have woodworking shops which would make it more difficult and expensive to obtain the feeders.

Therefore we tried a simple feeder made from tulip poplar tree branches. These feeders were simply freshly cut limbs 2 to 2 1/2 feet long (60 to 75 cm) in which holes of approx. 1/4" diameter (6mm) and 1-2" depth (2.5 to 5cm) were drilled. These have several advantages; including low cost and easy availability, a more natural appearance with natural bark to ease the animals' climbing, and greatly increased ease of filling since nothing had to be assembled and the feeders could be refilled in the exhibit. The use of freshly cut branches also provided moist food without having to soak it and the tulip poplar appears softer than the dowels.

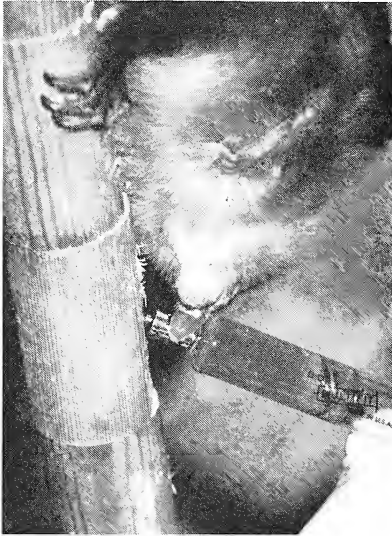


Natural branch feeders showing the damage resulting from the marmosets' gouging. Top is the pygmy marmosets' feeder and the bottom is the black-tailed marmosets' feeder. (Photo: Lee Miller)

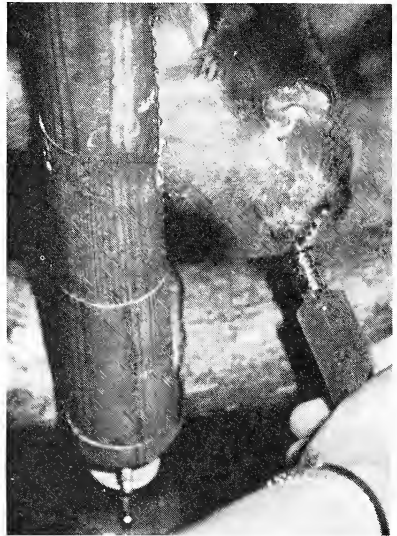
Conclusions

Although we did not achieve all the goals we intended to pursue, we believe that this study was very successful. It is very clear that the marmosets like gum arabic as a food. Whenever the feeders were removed to change them the animals would approach the keeper and feeders and act very agitated. The black-tailed marmosets would in fact climb on the feeders and come right up to the keepers. After replacing the feeders the keeper would place a bead of thick gum arabic solution along the top of the feeder using a syringe. The black-tailed marmosets rapidly started eating this and then started eating the gum directly from the syringe. This proved to be very helpful later when it was noticed that the female black-tailed marmoset had some malady with her mouth. Although she would take grapes by handfeeding, she usually would move away to eat the grape. By feeding her the gum directly from the syringe, the keepers were able to look at her jaw more easily and closely than they had previously. Subsequently the veterinarians were likewise able to use this technique to get a good look at her jaw. It was decided that the problem was a misaligned tooth, but since she had nursing young and was still able to eat, the veterinarians chose not

Use of an Artificial Gum-Tree Feeder for Marmosets. *Continued*



Male black-tailed marmoset, with infant on his back, licking gum arabic solution from syringe tip. (Photo: Lee Miller)



Male black-tailed marmoset eating gum arabic solution directly from syringe. (Photo: Lee Miller)

to pull her for treatment. Later, however, as a result of an additional problem of loose stools, the female black-tailed marmoset was caught and the misaligned tooth was extracted. The loose stool was the result of a parasite infection and again the gum arabic proved very useful as a means of medicating the female with Flagyl® mixed into some gum arabic solution and fed to the female using the now very familiar syringe.

The mere fact that the animals liked the gum arabic is not sufficient in itself to include this in their diet, however there is considerable evidence that tree gums or exudates are nutritionally valuable to these animals. Although an only recently discovered feeding strategy, there are several papers that propose that the gums, which are high in calcium and low in phosphorus, are very important to wild marmosets' nutrition. It is believed that this calcium to phosphorus ratio compliments the ratio found in insects and may be beneficial to the animals' reproduction and lactation. As a result of our literature search, we learned that a number of other animals have been documented using gum in their diet. The list includes: African loroid prosimians, bushbabys, patas monkeys, vervet monkeys, baboons (Amboseli), sugar gliders, Leadbeaters possum, pygmy squirrels, red squirrels, galagos and two bird species - the kori bustard (East Africa) and the *Coua cristata* (Madagascar). A very interesting review of gummivory is contained in a paper by Nash on this subject (Nash, 1986) and is strongly recommended to anyone interested in this topic.

We believe that use of gum arabic as a food may be quite beneficial to marmosets in captivity and plan to continue to feed this material to our marmosets using the more natural tree limb-type feeders. We also believe that this is an interesting and under-recognized feeding strategy and therefore plan, through use of signs, to make this more educational to the public. We further suggest that other zoos also investigate feeding of gum arabic to their marmosets with the hope to refine this as a benefit to the animals through better nutrition and husbandry and to the public as a more interesting exhibit.

Use of an Artificial Gum-Tree Feeder for Marmosets. *Continued*

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Letter to Brookfield Zoo AAZK Chapter:

"Dear Sirs and Madames,

Please rush off to me this very minute a copy of 'ZOO STORIES BOOK' as my home seems barren and lifeless without one.

Enclosed is a check which you may split whichever way you deem fit with Administrative Offices (AAZK).

I look forward to reading your spine-tingling tales!

Thank You, Thank You"

Don't let your home be barren and lifeless! Send \$4.20 (\$3.50 + 70 cents postage/handling) to:

**Brookfield Zoo AAZK
3300 Golf Road
Brookfield, IL 60513**

A Three Year Observational Study of the Double-Wattled Cassowary at the Cleveland Metroparks Zoo

By
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The cassowary is a primitive and almost prehistoric-looking bird native to New Guinea, many islands adjacent to New Guinea and Northeastern Queensland in Australia. Cassowaries are restricted to the tropical rainforests in these regions and keep to the most densely overgrown areas of the jungles, especially near streams, river edges and clearings in the forests. The population of cassowary differ slightly on each of the many islands they inhabit. Although thirty kinds of cassowary have been described, they have been united into three species, each with many subspecies.

The three clearly recognizable species include *Casuarius casuarius*, *Casuarius unappendiculatus* and *Casuarius bennetti*. The habitat occupied by each species seems to depend upon which other cassowary can occupy the same territory without losing genetic identity through interbreeding. (Campbell, 1985). Cassowaries are large, heavy-bodied ratites whose closest relatives are the emus of Australia. The two families, *Casuariidae* (cassowaries) and *Dromaiidae* (emus), together compose the order *Casuariiformes*.

Feathering on cassowaries appears to be a glossy black hairlike covering. Upon closer examination the drooping plumage is composed of double-shafted feathers, much like its relative the emu, but lacking the soft downy barbules. The thick mat that their feathers form helps protect the bird from thorny underbrush, and the lack of downy feathering allows for quick drying, advantageous in an environment characterized by months of daily rain. The rudimentary wings are reduced to three to six-inch long vaneless quills which curve against the body. When running these quills are extended at a 90° angle from the body and provide additional protection from thorny vines and branches. The featherless head and neck are crowned by a helmet or casque. This casque is believed to protect the face and neck from vegetation. When running the beak is pointed down with the casque pointed forward.

The skin of their featherless heads and necks display a remarkable combination of colors, ranging from light blue to a deep cobalt, splashed with vivid reds, purples and in some species yellow. Two species have decorative wattles hanging from their throats, *Casuarius casuarius* (double-wattled cassowary) and *Casuarius unappendiculatus* (single-wattled cassowary). The sexes vary slightly with the colors of the female being brighter and body size distinctly larger than the male, a size reversal occurring in no other ratite and very few other groups of birds. Cassowaries have stout and powerful legs with three toes, the innermost a daggerlike claw which grows to a length of 10-16 cm (4-6"). When needed for defense these claws become a formidable weapon. Leaping feet first and striking with its powerful, heavily muscled legs, many incidents have been recorded of this bird killing natives and even keepers. The forward, then downward thrust can puncture, then eviscerate the abdomen with ease. These birds can be equally dangerous to their own kind, thus making it impossible to introduce a pair unless both birds are in breeding condition and are willing to tolerate each other.

In the wild cassowaries feed almost entirely on soft fruits but have been known to kill and swallow whole small animals and insects. The main breeding period in the wild coincides with the availability of the most ripe fruit (Campbell, 1985). As with other ratites

A Three-Year Observational Study of the Breeding Behavior of the Double-wattled Cassowary at the Cleveland Metroparks Zoo. *Continued*

the incubation of the eggs and the care of the young are the sole responsibility of the male bird. Eggs are an attractive lime green, mottled with a darker green and are laid on the floor of the forest, usually in a slight depression.

Young cassowaries are brown and are often kept as pets in native villages where they are allowed to roam freely like chickens. They are often kept until they mature and they become aggressive. Adult birds are kept in small cages and fed vegetables and scraps of food. In some areas cassowary feathers are as valuable as shell money and the caged birds often are plucked of their feathers (Gilliard, 1958). Cassowary feather headdresses are common in New Guinea. The birds are also eaten by the natives and the whole bird is used, from feathers to meat to the bones which are shaped into daggers and scrapers.

The Cleveland Metroparks Zoo has exhibited Double-wattled cassowaries for many years. For many of these years, a single older male bird was our only specimen. After the death of "Charlie" due to old age, the decision was made to get a pair of young birds. A female nicknamed "Frankie" from the Denver Zoo was received in Cleveland in March of 1982 at the age of seven months. Frankie's arrival was followed a month later with the arrival of a male from Front Royal, age ten months. After a few months the male was nicknamed "Sydney". Frankie and Sydney had to be kept separate from the time they were received. Even at this early age they already showed the typical aggressive nature of the cassowary. For the next five years these birds were kept in adjacent cages and yards. During this time the only behavior exhibited by either bird towards each other was one of dislike. They both kicked and hissed at each other through the fence.

As years past, they grew into a mature and impressive pair both 1.5m tall (5 ft) and weighing approximately 50-60kg (120-130 lbs). During the summer the birds were kept in long narrow outside yards adjacent to one another but separated by chainlink fence. During the long cold winters they were housed inside in adjacent cages where they developed a "love/hate" relationship. After four years of total dislike for each other, behavior of the birds began to change.

In January of 1986, food consumption by the female was down by half. The male showed an increase in aggressive behavior, frequently kicking the walls and doors between the cages. The aggressive behavior of the female decreased, while self-preening of feathers of both birds increased. The female would stand and watch the male through the wire, while the male would try to kick the door between the cages as if he wanted to get in with the female. The female then began sitting in front of the door whenever the male would look at her. On 12 February 1986, the decision was made to put the birds together.

Once the door was opened the female would no longer sit. The female's wattles along with the skin folds on the neck became extremely swollen. After one hour of looking and walking around each other, the female chased the male back into his stall by hissing and trying to kick him. Frankie showed Sydney that she definitely was the more dominant of the two and she controlled the relationship. The birds were separated. The following afternoon reintroduction took place; neither one seemed interested in the other. It was decided the pair would not be left alone for any long periods of time. We wanted to be able to separate the two before any serious injuries took place if a confrontation occurred. The birds were separated after about an hour.

The third day the two were allowed access to each other at 0800 hours. Two and one half hours passed without either entering the other's stall. Then Frankie moved slowly into Sydney's stall. This seemed to intimidate and infuriate Sydney. He ran to the opposite end of his cage and began kicking the wall while Frankie stood and watched, still blocking the access to her cage. He then tried to run past her vocalizing in a way that signaled his frightened condition. As he passed her, she followed him into her cage. This intimidation seemed to be the end of any luck we would have with the two breeding in 1986. Frankie seemed to sense Sydney's frightened condition and decided to show him that there really was a reason to be frightened of her. She kicked him once in the back of his leg and that was all Sydney needed to become completely intimidated for that breeding season.

A Three-Year Observational Study of the Breeding Behavior of the Double-wattled Cassowary at the Cleveland Metroparks Zoo, Continued

The next month every introduction ended quickly by the male becoming very frightened and running from the female. This made Frankie mad and once Sydney would start running, she would start chasing and trying to kick. Although many behaviors that were believed to be breeding behaviors were observed, no interaction between the two lasted more than one half hour without the male becoming frightened and the female chasing him. Food consumption by both birds dropped almost in half. The male would vocalize with very low guttural noises. The skin folds on the necks of both would swell. The female would act very docile until the male began to act frightened, then she would chase him.

On 19 March 1986 the first egg was laid. Again the birds were put together in hopes of them breeding. Most visits between the two lasted only minutes. Six eggs were laid during the next three-month period, but none had the opportunity to be fertile. On 13 May 1986, the birds were put outside in their separate runs with no further visits possible. Through the summer Sydney became more and more aggressive towards keepers and Frankie. During this time it seemed that Sydney's bad experience with Frankie was forgotten, the time serving as a cooling off period. By 27 October 1986 the pair was once again brought inside for winter. The month of November showed a marked increase in aggression with both birds. Kicking doors, feeding bowls, and water buckets were daily occurrences. By the end of November the female became calmer while the male remained aggressive.

Nineteen-eighty-seven began with decreased overall food consumption, but a marked increase in the fruit consumption of their diet. Short visits between the two were allowed with no interaction taking place. Whenever the female began to show her dominance, the door between the stalls remained closed. Frankie began laying eggs on 28 March 1987. Her disposition changed and she became calm and docile, sitting most of the day. By 12 May 1987, Frankie had laid six eggs. Their time spent together, however, had Sydney spending most of his time ignoring Frankie. On 17 May 1987 their behavior began to change. Both birds remained calm. Frankie would sit whenever Sydney entered. Sydney began preening up and down Frankie's back. Visits began lasting 4-5 hours with no aggression.

On 22 May 1987 the first attempts to copulate took place. But on 23 May 1987, after six hours together, they began to fight and had to be separated. It took one week before Sydney wanted to make another attempt at breeding. During this period an egg was laid. Subsequent breeding activity seemed to take place within the first 15 minutes the pair was put together, followed by a confrontation after 3-4 hours. On 13 June 1987 the last breeding attempt for 1987 took place. The pair would no longer allow any peaceful interaction. The three eggs laid during the period they had together were artificially incubated but all proved to be infertile. Due to construction, the outside yards were no longer available for summer housing, therefore the pair remained inside next to one another all summer while their aggression increased.

In 1988 breeding behavior began early in January. Frankie sat and would not shift to a holding stall for her cage to be cleaned. At this time her wattles and skin folds swelled and the skin colors intensified. Access doors between the pair were opened. Frankie allowed Sydney to enter her stall without any movement towards him. He began to preen up and down her back while she remained in a prone position. His wattles and skin folds began to enlarge, while her skin on her face seemed to become swollen. She then appeared to go into a "breeding trance" with her eyes fixed and "glazed". She allowed the male to continue to preen her neck and back. She would straighten up every 5-7 minutes, then stand and begin excessive feather preening. She then entered Sydney's cage, still in her trance. He once again became scared, began vocalizing, and running in circles to try and run from her. Frankie began to become irritated by him and as he tried to get past her into her cage, she raised her foot as if to kick him. Surprisingly she reached out with her foot and gently touched him on the side as he went by. Because the male became very scared, the door between them was shut. Five minutes after separation, Frankie came out of her "trance".

A full month passed before Frankie once again began sitting by the door, but Sydney still was very wary and easily frightened by her. Whenever they were put together, the slightest

A Three-Year Observational Study of the Breeding Behavior of the Double-wattled Cassowary at the Cleveland Metroparks Zoo, *Continued*

fear that was displayed by the male signaled us to separate them before he would panic. Once panicked it would take from one week to one month before he was calm in her cage. The first egg of 1988 was laid on 21 February, one month earlier than the previous two years. During breeding it was observed that both displayed very enlarged wattles and skin folds, also excessive self-preening would precede any copulation. During the months of February, March and April 1988, the birds seemed to get along very well. They would sit when separated and vocalize toward one another. The female would make a noise which could be felt as well as heard, sounding like the low rumble of a large semi-truck.

Breeding would take place usually within the first 10-15 minutes they were put together, but they would sometimes breed again after 3-4 hours. Even though there were many confirmed copulations, all sixteen eggs that were laid showed no signs of fertility. The amount of time they spent together increased to 4-6 hours usually without any aggression. Tolerance for each other ended in June, and the male was moved to an outside yard in July for the summer while the female remained inside. This is the first sight separation that both have had since 1982 when they arrived. Although no eggs were fertile, 1988 proved to be a very promising year in anticipation of the 1989 season.

When notes for the three years were compared, certain behavior patterns emerged. A decrease in food consumption always preceded the period that the female became receptive. Once egg production began food intake rose to normal levels. The male's food intake decreased whenever he became interested in the female. Favorite fruits or chicks were readily taken food at times of low intake. During receptive times, the female seemed to have an area of her back and neck that, when stimulated, caused her to go into a breeding posture. This was observed when both the male would preen her or she was touched on the back with a push pole. The time the female spent sitting increased in length and frequency. Time spent pacing increased for the male. Another observation common all three years was the behavior the male showed during pursuit of the female. As long as the male would do the pursuing everything was fine. When the female would turn and walk towards the male, he would want nothing to do with her and they would have to be separated due to his intense fear.

Vocalizations also changed during the breeding season. Although common drumming (similar to emus) and hissing occurs, much more grunting and bass-like humming was heard. The female also showed an extreme dislike for the color maroon (similar to the colors of her neck folds when stimulated). This was observed when a maroon colored jacket was seen by her in front of her cage, or even a small maroon cup held by the keeper. Speculation was that the maroon may have been mistaken as another female with swollen skin folds, and she did not want another female in her territory. Because these behavioral observations were done only on one pair of double-wattled cassowary, these traits may or may not hold true for other captive or wild cassowaries.

Our pair will be moved within the next few years to an exhibit in the new Rainforest building which is scheduled to be completed in 1990. This \$16.8 million one-of-a-kind facility will be able to house and display the cassowary in a much more naturalistic setting. The birds then will also be on display all year long.

*Female double-wattled cassowary is on breeding loan to the Cleveland Metroparks Zoo from the Denver Zoological Gardens.

**Male double-wattled cassowary is on breeding loan to the Cleveland Metroparks Zoo from the Conservation and Research Center, Front Royal, VA.

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Photo Credits

--Slides of single-wattled and Bennets cassowary courtesy of Los Angeles Zoo.

--Slides of Irian Jayan natives courtesy of Rev. John Cutts.

--Slides of young cassowaries courtesy of Cleveland Metroparks Zoo.

--Slides of adult cassowaries "Sydney" and "Frankie" by Scott M. Wright.



Successful Techniques for Hand-Raising an Egyptian Fruit Bat (*Rousettus aegyptiacus*)

By

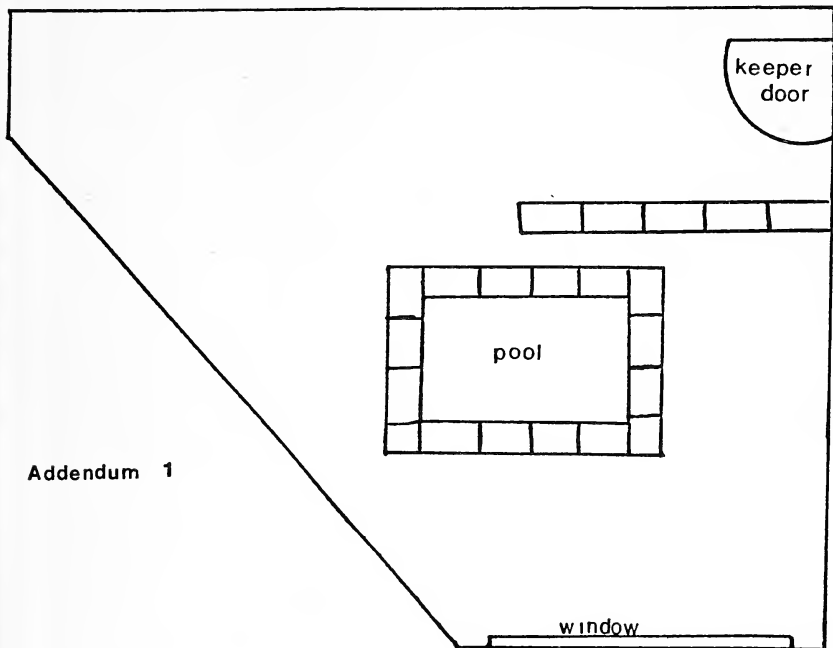
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Syracuse, NY

On 15 July 1986, the recently renovated Burnet Park Zoo acquired 8.5 Egyptian Fruit Bats (*Rousettus aegyptiacus*). The colony of bats was put directly into their new exhibit. The five-sided exhibit measures approximately 4m x .5m x 4m x 3m x 2m and is approximately 3m in height. The ceiling is composed of 1.5" (4cm) square painted hardware cloth with 1/4" (1cm) mesh wire on top. A 30cm wide stepped cement wall hides the keeper access door in the back right corner. The pool, lying just in front of the exhibit window, measures approximately .5m x 1.5m and is 8cm deep. (See Addendum 1). The bats are able to hang from the ceiling mesh, the stepped wall and the brick outlines of the back walls bas-relief.

The exhibit is serviced in the early morning. Initially, there was a sand substrate on the floor, however, we soon realized how time consuming it is to scoop up individual bat stools. At the present time there is no substrate on the concrete floor. The exhibit walls, floor and window are simply hosed down and scrubbed everyday. The exhibit is on a reversed light cycle with white fluorescent lights on in the evening until 100- hours and a mixture of blue, red and white stage lights on from 1000 hours until evening. The timers are adjusted to correspond with New York State ambient day length.

The bats quickly settled into the darkest corner of the exhibit farthest from the public. Breeding was observed within a month of their release. One female aborted a 10 gram fetus in early September. In January two other females gave birth. The males exhibited a lot of aggressive behavior towards the first baby and its mother. The baby was found dead in the exhibit when it was 24 days old. The other baby, a male, was knocked to the floor at 27 days of age. A keeper was present and able to replace him on the ceiling mesh where his mother quickly retrieved him. The next female to give birth broke her pelvis during delivery and subsequently lost control and feeling in one of her legs. Because she could not hang well with the added weight of the baby, she was removed to a holding cage. There she successfully raised her female offspring to four months of age. Unfortunately, the mother's foot became badly infected and she had to be euthanized. Her baby was successfully reintroduced into the colony at four and a half months of age.

BURNET PARK ZOO'S BAT EXHIBIT



Addendum 1

$\frac{1}{2}'' = 1'$

The fourth and fifth babies, born in late March and late June respectively, were found dead in the exhibit with their placentas still attached. Our sixth baby was born on 28 April 1987. This infant, which shall be referred to as Rosy, was successfully protected by her mother from the aggressive approaches of the male bats for about eleven days. The males would beat them with their wing claws and occasionally pull the baby from the mother with their teeth. On Day Ten the mother was still retrieving Rosy from the floor, but by Day Thirteen she had given up and Rosy was removed from the exhibit for hand-rearing.

Rosy's initial prognosis was not very good. She had multiple bite wounds on her head and chest and a small amount of bleeding from the nose due to at least three falls from the ceiling. Our veterinarian examined her and administered an injectable antibiotic. It was agreed that Rosy should be taken home overnight. She was placed in a small cardboard box with a top made out of half-inch (2cm) mesh. A heating pad, set on low, was placed under the box for warmth. Rosy was provided with a sock tied in a knot with a piece of cloth safety pinned to it as a surrogate. She readily clung to this surrogate. Rosy was offered a formula of one part evaporated milk to one part distilled water from an eye dropper at two-hour intervals. After each feeding she was stimulated to urinate and defecate. (Stimulation was continued until the age of three weeks.) Over the course of the night she only consumed 4.25ml.

The next morning Rosy weighed 33.6 grams and measured 9.5cm from nose to tail. A formula for infant Indian Fruit Bats (*Pteropus tonganus*) submitted by the Oklahoma City Zoo was found in the AAZPA Infant Diet Care Notebook. This formula, which is Formula A described on Addendum 2, consisted of one part powdered nectar mixed with distilled water to two parts evaporated milk and one quarter teaspoon protein powder. The formula

Successful Techniques for Hand-Raising an Egyptian Fruit Bat, Cont'd

was warmed to room temperature before feeding and was offered in a 1cc syringe. Rosy took to this formula readily and began to consume more at each feeding. Feeding intervals were increased to every three hours. As a note of caution, Rosy took to the formula so well that at times she consumed more than she could digest. Being an ignorant first-time bat mother, I began to increase the amount of formula according to her demand. Rosy was gaining weight nicely, but she had continual diarrhea. Once we realized that the diarrhea was caused by the formula being forced to pass through her digestive tract too quickly, Rosy was cut to 3.5ml per feeding and quantities were increased more slowly.

Rosy's injuries healed quickly and she showed no signs of brain damage. By three weeks of age she would regularly groom herself and exercise her wings after each feeding. At five weeks of age, three grams of baby rice cereal with banana were added to the formula (See Formula B on Addendum 2). Rosy was fed the milk formula five times a day and formula with cereal at the 0900 and 1500 hour feedings. This schedule was followed for three days then she was given formula with cereal at all seven feedings.

Rosy was hand-held upside down while she ate and was given the opportunity to flap her wings before, during and after her feedings. At five weeks of age she went through a stage where she would bite the hand that fed her. She would also bite and wing beat the surrogate when put back into her box. This may have been teething behavior but this had not been definitely determined. We used a glove on the hand with which she was held due to her needle-like claws on her feet and wings.

At seven weeks of age formula with cereal was being fed six times a day and a small amount of mashed banana was offered at mid-morning and mid-afternoon. It was at this point that Rosy became more active at night, flapping vigorously in her box and vocalizing. At fifty days of age she took her first brief flight.

By eight weeks of age, Rosy was receiving a regular bat diet (See Addendum 2) twice a day as the adult bats do. The number of feedings of formula with cereal were gradually reduced over the next two weeks as Rosy lost interest in it and no longer completely digested it.

Rosy was exercised regularly in a large room where she could sustain flight in order to strengthen her wing muscles. In October, at four months of age, Rosy was placed in the holding cage with an adult female bat. It took her about four days to actually hang next to the other female. Even then, whenever the cage was serviced, Rosy would come down to get human attention.

At this time, a graduate student from the SUNY College of Environmental Science and Forestry, Michelle Hirth who was studying our bat colony, obtained color coded necklaces so that the bats could be individually identified. We now refer to individuals by their necklace color.

The female bat introduced to Rosy in the holding cage wore a red necklace. In late November Rosy and Red were placed in the bat exhibit. Red was accepted back into the group. Rosy was not so lucky. She spent most of her time hanging off the side of the pool and away from the other bats. Whenever we replaced her on the ceiling mesh, it was only seconds before one or two males would knock her off. By the seventh day Rosy was very battered and had started to lose weight. Consequently she was removed from the exhibit. Rosy was given a month to recover and regain her strength. But in January a second reintroduction attempt lasted only one day. The males again behaved aggressively towards Rosy. When Rosy was removed, a geriatric male who could no longer fly was also removed for his protection and her company.

April 1988 was a very busy month for our female bats. A baby was born to Green on 1 April, but it was found dead in the exhibit with the placenta still attached. Silver gave birth on 5 April and raised her baby successfully in the exhibit. On 7 April Gold gave birth to a male but it did not survive. It was noted on this day that Orange was in the last stages of pregnancy. She was removed to the holding cage so that she could deliver in more protected surroundings. On 10 April Orange gave birth to a female. Finally, on 30 April a fifth female, Red, gave birth in the exhibit.

Successful Techniques for Hand-Raising an Egyptian Fruit Bat, *Cont'd*

Addendum 2

Weeks of age	Amount offered	Feeding intervals	Formula type & Additional feeds
2	1 ml	2 hrs 8x	
3	2 ml	3 hrs 7x	A
4	3.5 ml		A
5	4 ml	3 hrs	A: 5x B: 2x for 3 days
6	5 ml	3 hrs 7x	B
7	5.5 ml	6 x	B 2x 1 t. banana
8	6 ml	5 x	B 2x bat diet free choice
9	6 ml	4 x	B: avg. consump. less bat diet
10	6 ml	3 x	B bat diet
12		weaned	bat diet only

Formulas:

A: 25 ml distilled water plus 1/4 t. powdered nectar
 mix & discard 5 ml add 40 ml evaporated milk
 and 1/4 t. protein powder

B: to above add 3 grams dry rice baby cereal w/ banana

Bat Diet: chopped finely:

apple, banana, grape, orange, egg white, cooked ground beef,
 protein powder and calcium

In early May it was decided that Rosy should be given another chance in the exhibit. Because of the recent births and the reintroduction of Orange and her baby, it was hoped that the males would be too distracted to bother Rosy. The males harassed Orange and her baby for about three hours but she was very defensive. She was soon accepted back into the group. Rosy, on the other hand, was continually attacked by the males. By the fifth day she had to be removed.

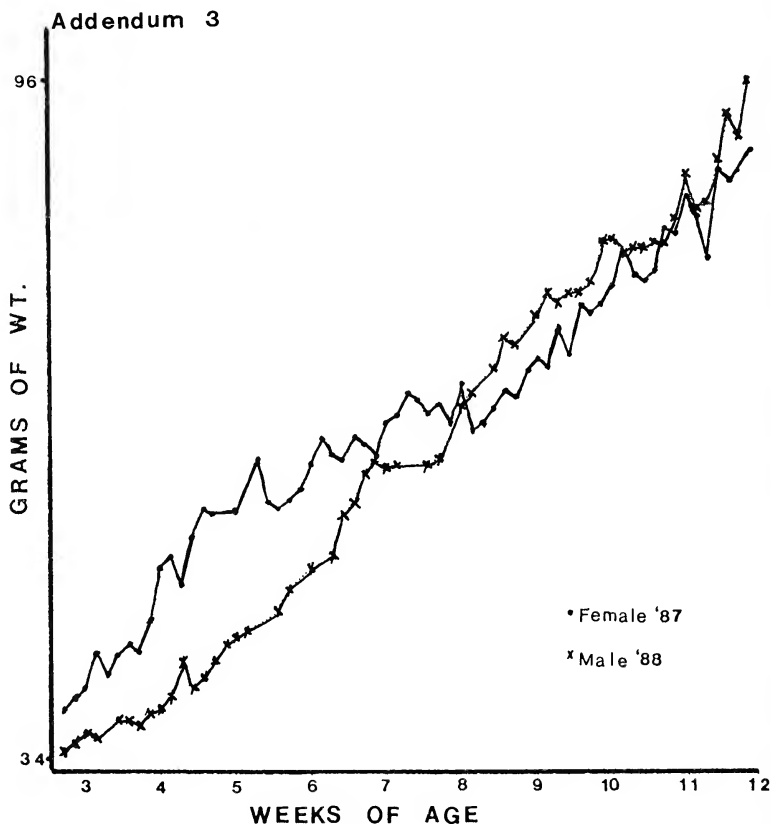
On 16 May Red and her baby became the victims of the males' aggression. Her baby was knocked to the floor. We replaced it on the mesh but it was then knocked off into the pool. We put the baby directly on its mother's nipple but she bit its head and refused to let it cling. In light of the difficulty experienced in introducing Rosy to the colony, we had strong reservations about hand-raising another bat. At this point there was no alternative. The male infant, named King Tut, was hand-raised from seventeen days of age using the same formula and feeding schedule that worked for Rosy. He progressed quite nicely as can be seen by the growth chart (See Addendum 3).

Tut was a much better flier than Rosy ever was. Three weeks after being introduced to Rosy and the geriatric male, Tut was put into the exhibit. He did well flying away from the malicious male bats but that is what he continued to do...fly. Every time he tried to hang

Successful Techniques for Hand-Raising an Egyptian Fruit Bat, Cont'd

and rest he got attacked and would fly to another spot. Within an hour he was exhausted and overheated. Shortly after he was removed from the exhibit he had a series of seizures. Luckily, Tut recovered without any permanent damage and is now housed with Rosy and the geriatric male.

In conclusion, we have successfully determined a formula and feeding schedule for hand-raising *Rousettus aegyptiacus*. Powdered nectar seemed to enhance flavor which caused the infant bats to eagerly consume the formula. The regular bat diet can be introduced at just two months of age. Exercise is very important and the baby bat should be given every possible opportunity to do so. Our only dilemma lies in socially acclimating the hand-raised bats into the established colony. However, we have not given up yet. Our next idea involves removing some, possibly all, the adult males to an off-exhibit area which will give the hand-raised bats a chance to get acquainted with the adult females. If this proves to be successful, we will reintroduce the males a few at a time. Ultimately, we hope to have all the bats in the exhibit.



Successful Techniques for Hand-Raising an Egyptian Fruit Bat. *Cont'd*

Products Used

Caltrate 600® (a calcium supplement): manufactured by Lederle Laboratories Division, American Cyanamid Company, Pearl River, NY 10965.

Carnation® Evaporated Milk: manufactured by Carnation Company, Los Angeles, CA 90036.

Gerber® Rice Cereal with Banana: manufactured by Gerber Products Company, Fremont, MI 49412.

Joe Weider's Sugar Free 90-Plus® (a powdered protein supplement): manufactured by Weider Health and Fitness, Inc., Woodland Hills, CA 91367.

Nektar-Plus® (a powdered nectar): manufactured by Nekton U.S.A., Inc. 14405 60th St. N., Clearwater, FL 34620.

Reference

Bietz, A. and Taylor, Steve. (1984) Infant Diet Care Notebook. AAZPA Publication.

Acknowledgments

I would like to thank all the Small Mammal Keepers for helping with the feeding of Rosy and Tut. A special thanks to Adrienne Whiteley Moore, Small Mammal Senior Zoo Attendant, for her patience, expertise and assistance in helping me to raise Rosy and Tut and in writing this paper; and to Don Moore for his professional suggestions. Also, a thanks to Michelle Hirth for her slides.



Information Please

Baltimore Zoo Giraffe Keepers are seeking information about material used on top of indoor giraffe pen floors at other zoos. We'd like to know about the successes...and the failures, and the positive and negative aspects of each material. Ours are currently kept on concrete floors. Please send information to: Baltimore Zoo Giraffe House, Druid Hill Park, Baltimore, MD 21217.

I would like to correspond with keepers who presently work or have worked with African animals in a mixed-species exhibit. This would probably involve answering a brief questionnaire about the positives and negatives of this type of animal exhibit. Please write to: David Thornton, Brookfield Zoo, 3300 Golf Road, Brookfield, IL 60513.

The Calgary Zoo is now in the process of updating our Animal Restraint Manual. Any additional or updated material you feel would be of use to us would be much appreciated. Please send information to: Cathy Gaviller, c/o Calgary Zoo, Box 3036, Stn. B, Calgary, Alberta, Canada T2M 4RB.



Panda Magic at the Calgary Zoo

By
Leslie-Ann Drummond
Giant Panda Keeper
Calgary Zoo, Calgary, Alberta, Canada



This past year has been an extremely exciting and challenging one for every member of our staff at the Calgary Zoo as we participated in a phenomenally successful seven-month display loan of two Giant Pandas (*Ailuropoda melanoleuca*) from 5 February through 5 September, 1988. As many of us know, the zoo community is currently embroiled in a controversy on the validity of giant panda loans. Are they exploitive or are they educational? I truly believe the Calgary Zoo did an exemplary job in ensuring our pandas were utilized only to spread, to their enamored public, some conservation propaganda about endangered animals everywhere. Our loan emphasized public education and the generation of revenue funds to be used in conservation programs.

The seed for negotiating a permanent panda loan was planted in September of 1985 at the suggestion of the Beijing Zoo Director, Li Yang Wen, when the Calgary Zoo was host to the 40th annual conference of the International Union of Directors of Zoological Gardens (IUDZG). In January of 1986, our management boldly proposed consideration for a permanent loan of breeding giant pandas, but received no answer from Chinese officials. Then, in April of 1987, negotiations were initiated for a temporary loan of giant pandas to run concurrently with the 1988 Winter Olympics held in Calgary during February. The Chinese eventually agreed to a seven-month loan, the longest panda loan ever negotiated, but intended to send 11- and 14-year-old animals. Our zoo director, Peter Karsten, adamantly refused this as the Calgary Zoo was committed to receiving only non-breeding animals so that we would not disrupt the breeding potential of loan animals that should be integrated into Chinese breeding programs. The Chinese honored this stipulation and made arrangements to send us from the Chongqing Zoo, a 2 1/2 year-old female and an 18-year-old male, Wei Lun, who was an inappropriate candidate for a breeding program as he was considered too old. However, Wei Lun had to be replaced with a 4 1/2-year-old female as he developed an eye infection in the days prior to shipment.

The terms of the loan were as such: The Chinese Association of Zoological Gardens was to be sent a minimum of \$500,000 (the actual figure was \$650,000) to be used ONLY in the establishment of an Endangered Species Breeding Facility used for giant pandas, and eventually for Takin and Golden Monkeys. As well, the Chinese would supply souvenirs to be sold in our gift shop. Additionally, after zoo attendance exceeded one million visitors, the Chinese would receive 50 cents per gate admission thereafter. The Calgary Zoo also sponsored a one-year scholarship program for one Chinese student to attend the Faculty of Environmental Design at the University of Calgary, and sponsored a member of the Chinese Government to attend English classes at Mount Royal College in Calgary. The Calgary's Apprentice Training Program and our Animal Restraint Manual were also translated into Chinese for use in Chinese zoos. All profit the Calgary Zoo realized will be placed in our conservation fund which contributes to the preservation of many North American species, among them the Swift Fox and Burrowing Owl. Total cost of our Panda Magic was \$5 million.

The panda facility was built on the site of our Waterfowl Lagoon in our Eurasian area of the zoo, which, according to the zoo's masterplan was to be eventually converted into an Asiatic black bear enclosure, another endangered species native to China. These two animals are

Panda Magic at the Calgary Zoo, Continued

currently housed in the last of our archaic barred enclosures. In the next few weeks these two long-term residents of our zoo will retire to the luxury of our empty panda enclosure. The panda enclosure was built at a cost of approximately \$350,000 and provided our guests with a total of 626 square meters. The outside enclosure (480 sq. m.), to be used only when ambient temperatures exceeded 0° C (32° F), was a grassy area complete with a waterfall, pool, large fallen tree for climbing, gunnite rocks, and metal leaf-shaped shade structures which were nicknamed "panda pads". However, these pads were not utilized by the pandas for shade, but rather for sleeping or playing platforms. Plans to "panda proof" the exhibit by electrical fences atop the perimeter panels were unacceptable to the Chinese so corrugated plexiglass panels were used for containment. Although the facility was quite functional, the one major flaw of the outdoor enclosure was that the pool was built without a drain, but rather had a continual, non-recirculating flow of pumped river water, which exited through an overflow system. This meant thoroughly draining, cleaning, bleaching, and disinfecting the pool was a frustrating and time-consuming job. A shade roof was constructed in April at the insistence of the Chinese to provide the pandas with some relief from the summer sun, but the pandas rarely made use of this addition.

An inside enclosure was also built to be used during inclement weather, or when outdoor temperatures dropped below freezing. Providing the pandas with an area of 126 sq. m., the inside facility was glassed in, heated to 12° C, with an unheated pool, panda pads, and a mesh dividing wall down the middle to limit contact between the two pandas. The interior and exterior exhibit areas were connected by a holding facility (85 sq. m.) consisting of a keeper kitchen and three holding pens, or bedrooms. During off-exhibit hours both animals were kept separate in this secure facility. The holding pens were simply furnished with raised wooden sleeping platforms, and feed trays for water and gruel. The pens were linked by a shift tunnel. One holding pen had a removable plywood platform which could be replaced by a portable scale. This addition was extremely valuable as it allowed stressfree, accurate weekly weighing.

In December of 1987, the Canadian Technical Team of four full-time keepers were chosen on the basis of a targeted selection process. The team worked 3 1/2 month shifts, with one keeper, myself, working the entire seven-month period. After May, two late-shift keepers were added who were responsible for locking the pandas into the holding pens at the end of each day.

Our black and white ambassadors from China arrived on 4 February, via Canadian Airlines, which sponsored all air travel. Xi Xi, a 2 1/2-year-old female arrived at a weight of 55 kg. She gained 31 kg during the course of the loan and remained in exemplary health. Xi Xi was considerably smaller, with longer fur, rounder face, and a less compact body than her companion, Qun Qun. She can best be considered as a laid-back, cooperative animal. Qun Qun, our 4 1/2-year-old female arrived at 109 kg which is average for an adult captive female. She expanded to a rotund 122 kg by September. She was an "independent female" only willing to cooperate if it suited her, or sometimes not at all. She presented us with several medical and behavioral challenges.

As with other giant panda loans, the animals came accompanied by a Chinese technical team consisting of a veterinarian, a keeper/foreman, and an interpreter. Like the Canadian team, the Chinese team was replaced with new team members in May. Theoretically, the Chinese team was to fill a supervisory role only, and were discouraged from assisting in basic section maintenance and the feeding and shifting of animals. Although these restrictions were adhered to with the first technical team, they were relaxed for the second team which resulted in many frustrations and some conflict. Maintaining harmonious relations with the Chinese technical team was one of the greatest challenges in diplomacy for the Calgary keepers.

Most animal enthusiasts know pandas eat bamboo. Ninety-nine percent of a wild panda's diet is bamboo, and in fact the word "panda" is derived from a Nepalese word meaning bamboo-eater. The remaining one percent of a panda's diet consists of over 25 plant species, small mammals, such as pikas, shrews, and bamboo rats, and carrion. It is theorized that pandas evolved from their carnivorous ancestry towards being a bamboo-

Panda Magic at the Calgary Zoo. *Continued*

consumer because historically bamboo was an abundant, year-round food source. The thick, dense wet bamboo forests which were once predominant in the mountainous areas of South Central China provided pandas with an endless supply of food. Caloric expenditure when harvesting the bamboo is quite low. Although pandas have been ecologically linked to bamboo for at least three million years, there are several biological challenges that are inherent in pandas. Firstly, the digestive efficiency of adult giant pandas has been determined to be only 17% compared with 25% for geese and 80% for cattle. Secondly, the panda has retained the digestive tract of its carnivore ancestor yet subsists on basically a challenging vegetarian diet. Lastly, bamboo is a fairly nutrient poor species of grass with the propensity of totally dying after it flowers, which occurs every 40-120 years dependent on the species. These factors demand wild pandas spend up to 14 hours a day eating, and lead an energy conserving life. The digestive passage time is usually about 5-11 hours and this requires a panda to endure a continual 24-hour cycle of eating and sleeping (or conserving energy). But this is not to imply that giant pandas are evolutionary mistakes.

Giant pandas have undergone significant morphological changes to increase the efficiency in harvesting and digesting bamboo. Firstly, the molars have enlarged to provide the pandas with a crushing surface seven times greater than our own. The teeth are powered by massive jaw muscles which are lengthened and attach to a bony sagittal crest atop the skull. This provides the jaw with an impressive force that allows the pandas to utilize the most formidable stalk of bamboo. The digestive tract is thick and muscular and coats itself with a sticky mucous to further protect the gut from rupture. Perhaps the most phenomenal of adaptations is the pandas' pseudo-thumb, which is an unjointed extension of the wrist's radial sesamoid bone. This likens the panda's paw to a human's mitten with a shortened thumb. All pandas are incredibly dependent on this hand and it imbues them with an almost human-like quality. When Qun Qun was offered an apple, she would always accept the apple in her mouth, but then immediately transfer it to her paw.

At the Calgary Zoo each panda was offered 15-30 kg of bamboo daily. One hundred and twenty kilograms of bamboo was flown in, complements of Canadian Airlines, twice a week from a supplier in San Diego. The shipment was divided into 30 kg allotments and arrived wrapped in burlap. It was stored in a portable covered box with a mesh bottom and covered with damp burlap to preserve freshness. Quality of bamboo was erratic and at times was so poor we resorted to harvesting freshly grown bamboo from our conservatory where we had planted an emergency supply. By June we were well acquainted with the selectivity of pandas and we would pick through the bamboo bales selecting out stalks of bamboo that we had assessed would be acceptable by the pandas. Rejected, untouched bamboo was given to both the Lowland Gorillas and the Asian Elephants, to minimize the waste. Despite our initial culling of each bale, large quantities were still rejected or selectively picked at by the pandas, and much was discarded. The variable quality of bamboo presented us with our greatest frustrations.

Two species were fed - Umbrella bamboo (*Fargesia spathaceus*) and Golden Bamboo (*Phyllostachys aurea*). The two species were utilized quite differently. The thin, leafy stalks of golden bamboo would be held in the paw while the stalk and leaves would be quickly smelled to determine its freshness. Dry stalks would be nonchalantly discarded. The foliated branches of approved stalks would be bitten off, one by one, until a large clump extended from the side of the mouth. This clump would then be transferred to and held in the paw and savored one bite at a time. Pandas alternate the side of the mouth they chew on and this could prevent uneven wear of the molars. Umbrella bamboo had sparser but larger leaves and thick stalks up to one inch in diameter which was at times the favored part of the plant, especially for the older Qun Qun. The stalk would be held between the jaws and, with the force of the paw, cracked into smaller pieces. The outer indigestible bark was stripped off with the teeth and discarded into a pile. This exposed the central pith which is more nutritious and palatable. Over the course of the loan we noticed that species preference and utilization changed. At times umbrella was favored, but usually golden bamboo was preferred.

In addition to bamboo, Xi Xi and Qun Qun were fed sugarcane, apples (with a distinct preference for red delicious although only Qun ate them), and gruel or panda porridge, as I

Panda Magic at the Calgary Zoo. *Continued*

called it. Most facilities that house captive pandas supplement the bamboo offerings with a porridge to ensure adequate caloric intake. Every facility has its unique recipe. In our case the recipe was provided by the Chinese and contained 400 g hamburger, 550 g ground rice, 800 g blended carrots (all this cooked in one pot), 450 g cornmeal, 220 g soya powder, 220g flour, 180 g wheat germ, 100 g bonemeal, 3 raw eggs (cooked in another pot). After thoroughly cooking these ingredients the above was added to 2 liters of skim milk, 120 g sugar, 20 g salt, 10 ml cod liver oil and 1/2 tsp Vitamin E. This recipe made about 12 liters of porridge and offered the pandas 10,000 calories per day. Our induction into panda keeping began with learning from the Chinese the art of gruel concocting, which required one to two and one-half hours of cooking each morning. This long cooking time, in conjunction with thin cooking pots and other time commitments, caused the porridge to be unfailingly burnt every day. This became the source of ongoing jokes. But no matter how burnt the porridge got, the pandas loved it and it was their favored food. Gruel was fed three times daily and it and sugarcane were the only food items for which the docile Xi Xi and Qun Qun would aggressively compete.

In the spring, both pandas began grazing on the Kentucky Bluegrass growing in the outside enclosure. Xi Xi especially utilized this fresh grass growth. Grass grazing has been reported in at least two other captive pandas and makes entire sense as bamboo itself is a grass.

We, as zookeepers, know that what goes in comes out. Pandas are infamous for their bamboo diet, but they also have gained notoriety, at least at the Calgary Zoo, for their digestive end products. Wild pandas can defecate an average of 50 times a day for an average of 97 droppings passed in a 24-hour period. We noted three kinds of panda droppings. "Bamboo stools" were well-formed, green/brown boluses containing shards of undigested bamboo. When dried these stools would disintegrate into a pile of bamboo chips. "Gruel piles" were passed about 8 hours after consuming panda porridge and were orange to yellow with a high water content. Lastly, there is the infamous "mucous stool", the passage of which is dependent on health and bamboo consumption. The rule of thumb is the better the consumption of bamboo, the more infrequent the mucous stool. Mucous stools are not unlike "canned slime" found in toy departments. It is thick, sticky, tan to yellow in color and may cause the panda great discomfort for hours prior to its passage. Qun Qun especially would enter almost a torpor for about 6 hours. She would be impossible to arouse, but within seconds of passing her mucous she was her normal, boisterous self.

Since so little is known about the physiology and behavior of pandas, temporary loans offer the western world golden opportunities for research. Our veterinarian staff capitalized on this, undertaking several research studies. Digestive passage studies were conducted numerous times. Here, wheat kernels, acting as markers, were fed in the gruel. Ensuing stools were then collected and analyzed for number of markers in each, giving us the digestive passage time. The younger Xi Xi had a passage time of 6 to 9.5 hours and the older Qun Qun 6 to 12 hours. Dry matter digestibility trials were also conducted. Dry matter digestibility of bamboo and sugar cane was 42.5% for Xi Xi, and 39.5% for Qun Qun. Xi Xi was found to consume nearly 15% of her body weight daily, whereas Qun Qun consumed nearly 12%. The question we were trying to answer through this research was - How did the younger Xi Xi manage to gain weight and grow? We basically found that this younger animal ate a greater percentage of body weight, passed it through her system faster, and had a higher efficiency of extracting nutrients.

Urine samples were collected regularly for hormone analysis and composition analyses of bamboo and mucous stools were also conducted. Results are pending on all tests.

As mentioned, although Xi Xi remained in perfect health, Qun Qun, our 4 1/2-year-old, had some health problems. On 22 May, Qun suddenly developed what was superficially diagnosed as a "papilloma" in the inside corner of her right eye. This protuberance appeared in about 20 minutes and resembled a cherry pit. It caused her no discomfort, was treated with Ophthocort®, and subsided. Then on 10 June, we noticed Qun's appetite was declining and she was extremely lethargic, even for a panda, and spent much time soaking in the outside pool. Although she maintained her 122 kg weight during her month-

Panda Magic at the Calgary Zoo, Continued

long illness, she refused almost all bamboo, except for a few fresh shoots of golden bamboo, and the occasional apple. She subsisted almost entirely on panda porridge, but occasionally even refused it. The quality of stool deteriorated to only gruel piles, and sometimes loose diarrhea. The frequency of mucous stools increased due to the poor bamboo consumption. Ineffective treatments of tetracycline, vitamins, antibiotics, and yeast were tried at the insistence of the Chinese. These treatments were only stressful to Qun, and ineffective as we had no diagnosis of what exactly ailed her.

It became clear that Qun needed to be tranquilized so our vets could ascertain exactly what she was suffering with. The Chinese were reluctant to give approval for tranquilization but permission was eventually accorded us by the Chinese government after a particularly uncomfortable day for Qun in which she paced continuously. She had a uneventful immobilization with a Ketamine/Rompom® mix. After relocation to our Animal Health Care Center, she was x-rayed, and laparoscoped rectally and esophageally. Blood pressure, heart rate, and blood samples were taken. We took this opportunity to biopsy her apparent papilloma which had greatly subsided by this time. A supposedly high white blood cell count and unusual mucous from an impenetrable cervix indicated Qun Qun was suffering from a uterine infection. A regime of prostaglandins and antibiotics followed for the next five days, and within two days Qun's appetite and activity were returning to normal.

In early March, we suspected Qun Qun was entering estrous. At 4 1/2 years, Qun was still considered immature, as females enter reproductive fitness at 5 1/2 to 6 years. Although she seemed to enter an estrous cycle it should be noted that according to available literature, the youngest female that had conceived was 5 1/2 years old. Estrous was suspected when Qun's appetite declined. She refused all bamboo and sugar cane except between 700 and 1000 hours. Also, she began urinating while scent marking, a behavior which greatly increased in frequency. Often she would shake her head while marking, a behavior we had not seen before. The "bleat" vocalization (a combination between a goat and a spectacled bear call) was greatly increased in use, as a form of advertisement. Her activity, especially pacing, increased markedly. Other symptoms were flatulence, increase in mucous stool and a swollen vulva. These symptoms lasted 14 days.

As mentioned, public education was one of the mandates of the Calgary Zoo, and several programs were used to extend the message of panda conservation. A touring panda puppet show contacted over 75,000 children. Onsite grade school programs were given to 33,000 participants. Adult and family dinner, breakfast and bedtime programs educated 23,000 adults. And each of the 1.2 million visitors to the panda exhibit was subjected to a 7-10 minute live interpretative or taped program while viewing pandas. In all, our education department spread the word of the panda's plight and that of other endangered species to over 1.2 million people.

Like all pandas, Xi Xi and Qun Qun had an almost magical charisma. It is difficult to pinpoint exactly what given them such appeal, but it is likely a combination of several factors. Some of it is their bold black and white coloration with the enlarged eye patches that makes them expressionless and innocuous. Some is the human-like quality of eating food from the hand while sitting Buddah-like on the haunches. Some is their docile nature. But mostly, I think their high spirited and flexible antics of doing headstands in water dishes, or backward somersaults while biting their tails, or biting and shaking their paws in excitement, or even just panda jogging is what captures the hearts of all panda watchers. Because of their charm and appeal, pandas have been elected as representatives of all endangered wildlife. People listen when you talk pandas. The Calgary Zoo gave over one million people the once-in-a-lifetime experience of panda magic. At the same time they received a strong message of conservation and responsibility to nature. We hope the presence of Xi Xi and Qun Qun in Calgary made over one million people more conscious of the plight of all animals.

Special acknowledgments to: Greg Tarry, Sue Mainka, and Peter Karsten. Also Special Thanks to all our sponsors and public for giving me a once-in-a-lifetime experience that lasted a whole seven months.

But mostly thanks to two cute kooks, Xi Xi and Qun Qun, who won me over as a panda enthusiast, and whose amazing antics have given me some terrific rocking chair memories.



What Can a Kinkajou Teach You?

An Overview of Exotics in Educational Presentations at the San Diego Wild Animal Park

By
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San Diego Wild Animal Park
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I. Examination of the need for exotics in educational presentations.

With so many opportunities for an unwitting public to contribute to the decline of animal species, from the jewelry they wear to the furniture they sit on, it's no wonder that most people have developed little or no conservation ideals. Whether a keeper, a trainer, a docent or an administrator, we all have at some time been appalled by the lack of public awareness toward conservation. But who can we reach? There are, of course, the unflappable extremes: the idealistic tree-huggers on one end and the "get 'em while you can" exploiters on the other. But the grey area between holds those people who can be influenced and often have no real conservation philosophies. But how can we as animal care professionals begin to inspire people to a lifestyle that encourages conservation? The zoological facilities have at their disposal an unparalleled opportunity and obligation to the animal species in their care to help their visitors develop conservation ethics. One method is through education.

Education is often thought of as the "E" word. Whisper it; camouflage it. Don't ever tell your visitors that you are trying to educate them. It's like telling a child that spinach is good for him. Instead, like our parents sometimes did with spinach, we often disguise it: education as entertainment, education through participation, interaction, and even sensational animal feats. But in reality, it need be little more than natural behaviors and creative dialogue. In this paper I will offer an example of one department at the San Diego Wild Animal Park that uses trained exotic animals as living tools in an exhaustive approach to public education.

The need for tractable animals in educational presentations at the San Diego Wild Animal Park grew from the unique nature of the park itself. Since the animals are exhibited in a naturalistic, preserve-like setting, visible primarily from a monorail train, closer interaction with them is a natural public desire. The public has been accustomed to the visual and physical closeness that most zoos offer, and the Wild Animal Park has chosen to satisfy this need in one way with a variety of animal shows and informal animal presentations.

II. Description of Facility

One department at the Wild Animal Park that participates in educational animal programs is called Wildlife Workshop. It has a work staff of two animal trainers and four animal handlers, and its own collection of 27 animals. The collection consists of 11 mammals, 7 birds, 6 reptiles, 2 amphibians and one arachnid and represents 20 taxonomic families. Animals range from the familiar to the bizarre to the misunderstood. All maintenance care, feeding, cleaning, training of animals and presentation of animals is done by the Wildlife Workshop staff.

The facility itself is relatively new, built in an off-exhibit location in early 1987. It was designed primarily by Wildlife Workshop staff with input from veterinarians and the construction department. Off-exhibit gives the animals a relaxed home base and has allowed us to be very practical in the design of the enclosures. Most of our animals are permanent residents, however others, like a quick growing tiger cub, are short-term residents. To accommodate a changing collection, the enclosures are generically

What Can a Kinkajou Teach You?, *Continued*

designed with the capability of being customized. Branches, decomposed granite, den boxes, toys and feeding platforms are added as required, and portable cage walls can be removed to increase enclosure size, as we have done with our binturong cage.

A 50-foot remodeled trailer is on the facility grounds and houses the parrots, reptiles and other weather-sensitive animals. It is also the staff office, kitchen and food preparation area.

In addition, a unique feature incorporated into the facility is an eight-sided training pen. This structure is completely enclosed and provides a distraction-free environment needed in the early stages of training.



African serval, Speedy, demonstrates its jumping ability under the direction of trainer Terri Schuerman during the Critter Encounter Show. (Photo: Ron Garrison ©1988 Zoological Society of San Diego)

III. Departmental Responsibilities

Along with its animal-care duties, Wildlife Workshop is responsible on a daily basis for two "Critter Encounter" shows, four hours of informal public contact called Wild Welcome, and presentations to behind-the-scenes, guided tours offered by the park. Seasonally, we participate in Schoolltime Safari assembly outreach programs, traveling to over 70 schools per year, and extensive summer school programs. Our animals also assist in fundraising efforts, VIP presentations, commercial filming, Wild Animal Park special events, off-grounds revenue-generating presentations and public relations appearances. All this from a department that began nine years ago for the sole purpose of staging an informal summer show.

I credit three factors for the steady growth our department has enjoyed: the professionalism of the staff, the quality of the animals and most importantly, the response of the public.

What Can a Kinkajou Teach You? *Continued*

However, there is a fine line between success and failure. Four years ago, the executive director seriously considered closing Wildlife Workshop, in part, because we were not a visibly revenue-producing department. Luckily, a marketing survey conducted at the time showed that the public loved the close animal interaction, blended with a subtle educational message, and wanted more. Our department exploded with potential. The resulting commitment by the Wild Animal Park to this entertaining approach to public education has been increased staffing, a new facility and more animal acquisitions. Wildlife Workshop has responded by increasing its availability, tailoring presentations based on audience age or tour topic, and even training specific behaviors for TV commercials.

IV. Selection of Animals

In selecting animals for the Wildlife Workshop collection we try to represent a variety of educational concepts and programming opportunities, while reflecting the collection of the Zoological Society of San Diego and its many successes. In its first few years, Wildlife Workshop, out of necessity, acquired animals that were unsuitable for exhibit, available due to maternal neglect, or were unwanted or confiscated pets. There were few opportunities to select animals based on their educational value. As a result, we collected a diverse group of 20 animals, only four of which represented the Zoological Society's collection. Today, out of Wildlife Workshop's 27 animals, 15 represent species that the Society actively breeds and/or exhibits. This variety, by design, gives us a chance to introduce the public to the Society's breeding successes and explain the larger purpose of the Wild Animal Park.

Acquiring animals has advanced from the "take-what-you-could-get" method of the past to a systematic approach coordinating the programming interests of the education department, the long-term animal management concerns of the curatorial staff and the capabilities of Wildlife Workshop. For effective management of the Wildlife Workshop collection we have developed an Animal Management Plan for each animal. The plan outlines the function and status of the animal in the department, its future and the likely duration of its stay, the options available if it doesn't work out, and criteria by which decisions regarding the animal will be made. In practice, when an animal becomes a member of Wildlife Workshop, there are few uncertainties about it, as illustrated by the recent tiger cub acquisition. The cub, Shandar, was received from a private facility for loan for one year, after which he will be returned to that facility. In addition to the Animal Management Plan, Wildlife Workshop uses the following guidelines when acquiring new animals.

1. Cooperate fully with the other departments that may be affected by an animal acquisition, such as the curatorial staff, veterinary services, etc.
2. Consider all animal care requirements, such as diet and housing, before acquisition.
3. Acquire hand-raised animals if possible but do not "pull" an animal just for Wildlife Workshop. Use hand-raised animals as a result of maternal neglect, genetic over-representation, etc.
4. Represent the Zoological Society's animal collection and breeding successes with a large percentage of Wildlife Workshop animals.
5. Keep the collection as diverse as possible. Variety will increase the topics and educational concepts that can be covered.
6. Plan and prepare for collection changes. The majority of the animals should be permanent residents with a few that are rotated out at the appropriate times.
7. Consider an animal's tolerance to tactile interaction. Do not require that every animal be approachable and, in fact, avoid giving the public the impression that all wild animals can be petted.

What Can a Kinkajou Teach You? *Continued*

8. Make informed choices about species, sex, and age of animals. Seek information from trainers who have worked with similar animals.
9. Follow the Zoological Society's guidelines for show animals. Higher primates, large adult carnivores and venomous animals are considered unacceptable in educational shows.
10. Evaluate the use of a threatened or endangered animal on an individual basis. Can a short-term opportunity exist? Can the animal be resocialized with its own kind? If not, ask how certain are we that it can be kept permanently in Wildlife Workshop?
11. Take a generalist's approach to animal care. Realize there are others within the Society who are more informed about the species in the Wildlife Workshop collection. Seek information and their advice when necessary.

Although there are many guidelines to consider when acquiring a new animal, the ultimate goal is for effective animal care. Not giving consideration to any one of these guidelines could compromise the credibility of the program.

V. Handling and Training Methods

Once an animal is selected and acquired the handling process begins immediately. Safety of the animal, the public, and the trainer dictates that our animals be as tractable as possible. This is accomplished in various ways depending upon the type of animal and its history. For some species all that is required to make them tractable is a conditioning program. For example, we received a Burmese python who was stimulated to eat whenever her enclosure door was opened. After a period of repeated sessions using a snake hook and stroking, she became desensitized and calm when the door was opened.

Often we are fortunate enough to acquire an animal while still a baby. We may become the mother and/or authority figure in its life. In other cases, we may become a member of its flock, as with a cockatoo, or its colony, as with a meerkat. Although an animal may become extremely handleable by socializing with us and become familiarized with its surroundings, an additional option may be available to us. That option is training.

Training is useful in varying degrees, depending upon the intelligence of the trainee. A kangaroo with less than amazing mental powers can be trained, but not to the same extent as a binturong, which is both perceptive and intelligent.

Training can benefit all participants. The animals themselves are more stimulated, more active and less bored, and appear to anticipate their performances with a positive attitude. In addition, the educational value of a presentation is enhanced by demonstration of natural behaviors; for example, a parrot using its beak and zygodactylous toes to climb or a kinkajou hanging by its prehensile tail. Certainly the entertainment value is increased, and observers are much more likely to retain information when an animal is actively participating.

At the San Diego Wild Animal Park we use a form of training called operant conditioning. Simply put, an animal learns through consistent practice that certain actions will be rewarded and others will be ignored, thwarted and/or disciplined. For example, a serval on a leash is held taut when it tries to move away from the trainer and is rewarded when it returns to her. Discretion must be used in such situations to make sure the cat is not pulling away just so it can return to get its reward. We must be aware of who's training whom.

The entire philosophy in a training session is to encourage proper behavior through very positive approaches. A reward system, most often a food reward, is used in training a new behavior as well as in maintaining the quality of an established behavior. We allow our animals to choose their reward from items that would be found in their diet. The binturong

What Can a Kinkajou Teach You?, *Continued*

loves banana, papaya, yam, apple and grapes. The kangaroo likes grapes, yam and carrot slices. Our personal favorite is the Abyssinian ground hornbill's reward: dead crickets and beef heart chunks. These rewards are reduced or eliminated in the daily diet and used only for the working sessions. The animal's dinner is always given separate from training sessions and is not used as a reward in itself. To monitor proper animal weights, we weigh our animals regularly; mammals are weighed monthly and birds are weighed daily.

In order to communicate to the animal when a behavior has been completed properly, an auditory training "bridge" is often used. Our bridges are the word "good" and/or the sound of an alligator clicker. In practice it "bridges" the end of the behavior with the reward.

The Wild Animal Park strongly supports the idea that whenever possible animals are to be presented demonstrating natural behaviors. Circus-y types of behaviors, meant only to impress the audience, are avoided in favor of behaviors that express natural animal qualities. The jumping serval does not need a ring of fire to demonstrate his impressive natural ability.



Kinkajou, Linus, demonstrates how its uses its prehensile tail to delighted onlookers at SDWAP's Critter Encounter. Animal Handler Michele Lane provides a treat. (Photo: Ron Garrison ©1988 Zoological Society of San Diego)

VI. Presentation Guidelines for Animal Usage

A philosophy of professional animal care is inherent to every aspect of the San Diego Wild Animal Park and is reflected in how Wildlife Workshop presents its educational shows. A few of the guidelines we follow are:

1. Maintain the integrity of the animal at all times. Never make fun of an animal's natural trait or ability.
2. Neither contribute to, nor ignore, animal stereotypes.

What Can a Kinkajou Teach You? *Continued*

3. Avoid anthropomorphic terms when referring to an animal; for example, the owl is "happy" or the snakes "likes" to be petted.
4. Avoid terms that trivialize or demean when referring to an animal, such as cute, dumb, etc.
5. Incorporate personal stories about the animals to make them more real to the audience.
6. The use of audience participation and interaction is a very valuable educational enhancer and should be used whenever appropriate.
7. Make the audience aware of the differences between tame, domesticated animals and trained or conditioned wild animals.
8. Safety of the animal, the visitors, and the trainers is of primary importance at all times when in close proximity to wild animals.
9. Strive to keep the animal removed from the trainer for the majority of the time it is presented. In other words, instead of constantly holding the animal, work it on a platform or prop. This draws attention to the appropriate, non-human animal. The trainer should be secondary in the presentation.
10. Use "ooh-ahs" -- facts that surprise and amaze the audience; for example, the tongue of a kinkajou is three inches long and is used to probe honeycombs for honey.
11. Incorporate humorous anecdotes whenever appropriate.
12. Raise conservation topics whenever appropriate; the status of an animal, the causes of their decline, etc.
13. Give the audience ideas of how they can make a difference; recycling products, not buying exploited animal products, etc.
14. Avoid a doomsday approach. The audience needs a reason to hope for the future of animals and to know that they are helping by their support of the Wild Animal Park.

The bottom line in any educational program incorporating exotic animals is that the animal should never be compromised. Exotics are valuable tools that when used in a professional approach can instill concern and encourage support for wildlife, can help to applaud the accomplishments of zoological facilities, and can help the expression of conservation issues.

Education comes in many forms but it indeed can affect change. What can a kinkajou teach you? To care!

An African ecologist named Baba Dioum summed it up brilliantly when he wrote:

In the end we will only conserve what we love,
We will only love what we understand, and
We will only understand what we have been taught.



Imagine having your body left to science while you're still in it.

Three animals die every second in U.S. laboratories.

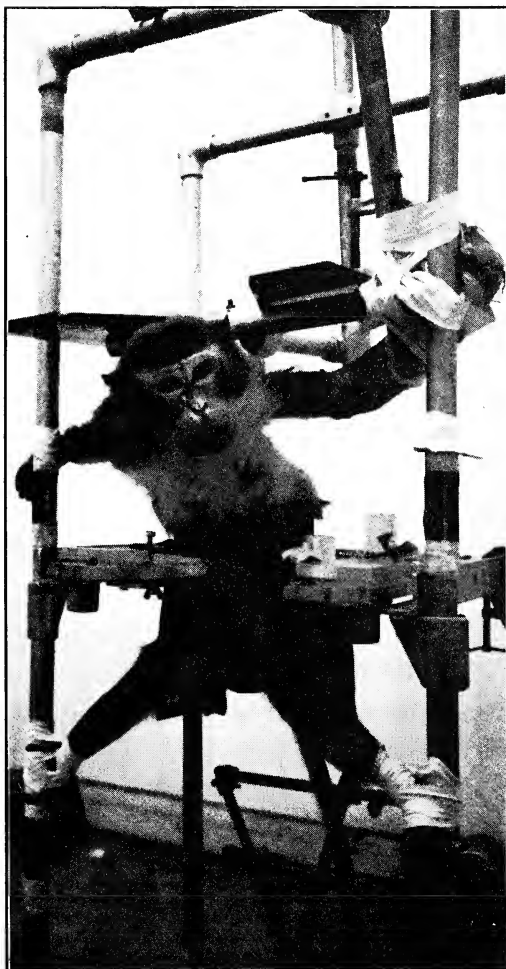
The monkey pictured here was surgically crippled and then forced to use his deadened arm.

Other animals, including rabbits, dogs, cats, pigs, rats, and primates, are routinely blinded, shocked, mutilated, decapitated and force-fed poisons in tests that could be easily replaced with modern and more reliable methods.

These animal tests are being conducted by the government, universities, medical associations, and private corporations. And always behind closed, locked doors.

If you think these kinds of cruel experiments have no place in the 20th century, please join us: People for the Ethical Treatment of Animals.

PETA is America's leading animal rights organization. By working with medical and legal professionals, the media, members of Congress, and people like you, PETA has been able to stop some of the most horrifying animal experiments, including the one pictured here.



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Washington, D.C. 20015

Taronga Zoo's Bird Department....

A new structure and philosophy - a keeper's point of view

*By Elizabeth Notley, Keeper
Taronga Zoo Bird Section
Taronga Park Zoo, N.S.W., Australia*

Nineteen-eighty-six was for Taronga Zoo's Bird Department a year of change. The old sections and duties were dissolved. A new acting Divisional Supervisor of Birds was appointed who, with the Curator of Birds, rearranged the whole department.

So far the new system seems to be working much more efficiently with keepers being given much more responsibility and a greater chance to develop professionally.

One of the initial changes occurred with the introduction of a new grading system organized with management and keepers. For the first time proper guidelines for each grade were set out so that an objective grading could be given to each keeper. The system is not perfect, but is much better than none, as in the past. Problems are being recognized and hopefully will be reviewed.

The new grading system is based on twelve levels. Keepers are no longer necessarily graded for supervisory skills which discriminated against some good keepers in the past. It is now possible to be graded purely on keeping skills and each keeper has the opportunity to reach Level 12 with either keeping or supervisory skills. The supervisory positions can also be rotational so others can gain experience.

The criteria for the new system naturally becomes more involved the higher you go.

Level 1 is for keepers on their six-month probation without prior zoo experience. They are also required to begin the Tech. course if not already enrolled. Level 2 then begins, the non-probationary keeper with the basic minimum skill requirements of an animal keeper.

The criteria are broken up into a number of areas. These are:

- 1) Level of supervision required.
- 2) Observation, i.e. of animal behaviors, health problems and maintenance problems.
- 3) Feeding, i.e. appropriate diets, clean water.
- 4) Hygiene, i.e. clean exhibits.
- 5) Animal health, i.e. routine health treatments, initially under supervision.
- 6) Animal contact, i.e. capture and restraints.
- 7) Security, i.e. locking enclosures.
- 8) Enclosure maintenance.
- 9) Public contact, i.e. being courteous and helpful.
- 10) Safety (with regards to animals, public and staff).
- 11) Records.
- 12) Section/other workers - communications and daily routines.
- 13) Other, as defined by the curator and supervisor.

From Level 3 Special Projects are added.

From Level 4 Graphics and Exhibit Design are included.

From Level 5 Public Relations, Research (with regards to operational exhibit and animal management problems) and outside contact are all new added criteria.

On the Bird Section, to ensure we are developing our skills in accordance with the new grading system, monthly reports are filled out by the curator using the above criteria to tell

Taronga Zoo's Bird Dept. - a new structure and philosophy - a keeper's point of view. *Continued*

what you physically and mentally did that month other than routine. This is to ensure you are not lacking in certain areas so that we are able to develop more professionally and are not discriminated against.

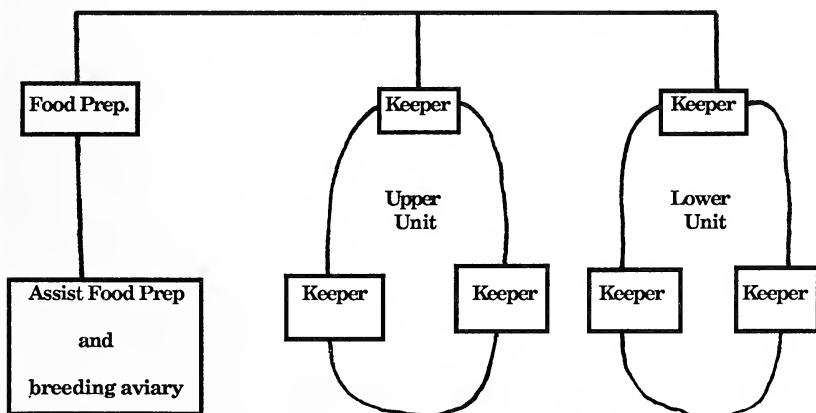
As mentioned earlier, the Bird Section then underwent a major restructuring. The reasons were mainly:

- 1) To be able to maintain the collection to a professional standard.
- 2) To give keepers credibility and responsibility.
- 3) To develop keeper initiative, something not always allowed before.
- 4) To develop and cultivate special qualities in different keepers to complement their interests and section.
- 5) To give keepers the opportunity of advancement under our new grading system.

Some have termed the restructuring a renaissance. Previously no set routine was worked out. Each day chores were allotted by the Head Keeper and initiatives could not always be used. It could not be guaranteed that you would be able to check your section or do what was necessarily needed.

The department was restructured so there are now four sections with two birdhouse keepers. The four sections were then grouped into two units with one keeper supervising and assisting the other two keepers in that unit (see Figure 1). Within the unit there was also one section considered more complex than the other so newer or more inexperienced keepers could begin on the simpler section.

Divisional Supervisor



A new food prep/nutritionist position was created. This was firstly to help review our bird diets which had not been changed for a number of years. This keeper also starts work approximately 1 1/2 hours before most others to get the complex diets ready and the food packed into buckets for the keepers to take with them when they arrive. In the past the food may not have been ready until 9-9:30 a.m. or even 10:00 a.m. By having it ready at 7:40 a.m. it allows feeding and checking of all sections before the zoo opens.

Following feeding, the rest of the morning until lunch is then normally devoted to routine cleaning.

Taronga Zoo's Bird Dept. - a new structure and philosophy - a keeper's point of view. *Continued*

In the afternoons the sections are then theoretically dissolved so time can be devoted to special projects and extra duties. These may include non-routine maintenance, study, research, extra observations, exhibit maintenance, public talks and the afternoon feeding as well as work on species management about which I will discuss more later.

The other innovation brought in by the curator was the development of a philosophy of the department which I believe reflects the roles we should all be developing. The philosophy is "To make a major contribution to the conservation of birds." Conservation is also one of the policies of the zoo.

A number of goals, tasks and strategies were then set. They were:

Goal 1. To display a range of bird species (primarily Australasian and Asian) illustrating various biological themes in a way that gives maximum positive impact to the public.

Strategy (a) Organize time efficiently so that maximum productive time is spent in the aviaries.

Task (i) Spend mornings cleaning and feeding so the collection is always presented to a high standard.

Task (ii) Be very critical of exhibits from public point of view - clean, labels correct and easy to see, birds easy to see.

Strategy (b) Sell our product.

Task (iii) Give public talks on the birds - such as feeding time with the flamingos.

Goal 2. Raise our skill base.

Strategy (a) To learn the latest incubation technology as it is pointless trying to save endangered species without proper techniques training.

Task (i) We attended a training course in incubation techniques.

Task (ii) We are practicing newly acquired skills by incubating eggs from our own sections that require artificial incubation - though at present this is minimal.

Task (iii) We are recording information about eggs and incubation. This can help provide valuable data for future reference.

Goal 3. Improve the value of the collection from a species management point of view.

Strategy (a) Acquire information (age, sex, identity to sub-species level) about specimens and permanently identify them.

Task (i) Whenever birds are handled they are banded if they have not been permanently identified. If already identified, data is recorded, using that number as a basis. At first we concentrated on banding Category 3 - monitored species birds on Wednesday mornings each week from 7-9 a.m. before the zoo opened. Measurements, weights and notes on plumage and molt have been recorded on all these birds. This was done with 1-2 keepers, John Disney (ex-Curator of Birds at the Australian Museum) and Libby Hall, Curatorial Assistant. Most of the keepers did a course in ornithological techniques at the Australian Museum to help develop our skill base in this area. Surgical sexing is also being done when necessary with data also being recorded when this is done. This work is important for it helps us obtain valuable data on Australian birds about which relatively little is known. By understanding our birds more, we hope better management practices will be developed.

Taronga Zoo's Bird Dept. - a new structure and philosophy - a keeper's point of view. *Continued*

Strategy (b) Construct management strategies for various species.

Task (i) The keepers have been asked to accept appointment as a species coordinator.

With so many species in Australian zoos and so little resources it is important that keepers become involved. The species coordinator is expected to form a team which gathers information on the species lineage, biology and husbandry. A number of workshops have been held - the last one was timed to coincide with the ASZK conference so a maximum number could attend.

In most cases people from other institutions will become involved so it is hoped that this will help foster communication between them. Though the great distances does make this difficult.

Aside from widening our skill base it is probably important that keepers become involved in species coordination so they realize how much cooperation is needed. Keepers are the ones who must carry out the recommendations laid down by the coordinators. So by being species coordinators themselves, they may be more careful in carrying out these recommendations.

Strategy (c) Rationalize collections.

Task (iii) A stocking policy with a regional view has been developed in which keepers were very much involved. The basic philosophy of the plan is that we firstly concentrate on Australasian species; secondarily on Indo-Pacific species with all others taking third place. For each species a computer printout will show the justification for keeping each species, the preferred number, location of exhibit and the management strategy.

By having easy access to this information it then means the keepers will know what directions to take for each species and be able to make decisions themselves. Some species, for example, we may not want to breed, so we have to take steps to prevent this.

With this sort of philosophy and goals, I believe that it will be easier for the keepers to justify their work as more and more they are becoming ethically involved. They take on more responsibility for their charges with inquiries being held on many deaths. It is also important that birds are being shown for a reason such as education and research with the old "stamp collection" no longer existing.

Finally, keepers are also being encouraged to work with "outside" conservation issues. These include projects such as breeding Mallee Fowl and Norfolk Island Parrots. The long-term plan with these issues is the second objective for the keepers after gaining necessary keeping and management techniques in the zoo - basically we are the ones that are the professionals and thus should be involved.

To sum up, I hope you can see that keepers are having to become more professional in their approach to animal management by developing a much wider skill base. I think the way our department is now structured gives us more incentive to maintain our exhibits to a very high standard, as well as managing our stock in a much better way.

References: Taronga Zoo Grading System

Acknowledgments: to Ron Parrish and Graeme Phipps for their usual guidance and support.



Breeding Success and Rearing of Offspring in a Group of California Sea Lions (*Zalophus californianus californianus*)

By
Florence Klecha, Wild Animal Keeper
New York Zoological Park
Bronx, NY

Introduction

The sea lion pool at the New York Zoological Park was renovated between 1980 and 1981. This paper will explore the effects of the changes on a group of California Sea Lions (*Zalophus californianus californianus*) that have been housed in the exhibit since then; a period covering the last seven years. Success in breeding, rearing of young, and the roles of two bulls, presently ages 9 and 20, will be covered.

Methods

All data and observations were taken from the daily log maintained by the senior or relief keeper or from the New York Zoological Park records. Since 15 October 1987, an additional data sheet was used to concentrate on the behavior of the pups (Figure 1). It should be noted that a number of individuals have been involved in obtaining data.

Pups born in 1987 and 1988 were marked because there were more than one and it became increasingly difficult to identify them as they became more independent. Two methods of marking were used: shaving a patch of fur; or freeze branding using liquid nitrogen and a 1.9 cm (3/4") diameter brand. Pups with their corresponding markings are listed in Table 1. Freeze branding was employed so that anyone could identify the pups. The fur in the shaved areas would eventually grow back in.

Exhibit and Maintenance

Prior to 1981, sea lions were housed in an exhibit with a 632,164 liter (167,000 gal) pool with an average depth of 1.5-2.13 m (5-7 ft). Two small islands were at either end and a 1.37 m (4.5 ft) wide ledge for hauling out formed the perimeter. At the back of the exhibit was a concrete structure resembling rock, in which four dens were located. Three of the dens faced the front. A 1.22 cm (4 ft) fence, turned in at the top, was the only means of confinement (Figure 2).

Between 1980-81, the California sea lion exhibit was renovated to simulate rookeries that are found along the California coast. The dens which were not changed in any way are now at the center of the exhibit. Behind the dens, a large cobblestone basking area (which is seldom used), a beach, tidal pool, and a wall (which acts as a windbreak) were added. One island remains to the left of the dens. The rest of the exhibit is taken up by the larger 757,082 liter (200,000 gal) swimming area. This area now has a maximum depth of 2.4 m (8 ft), which decreases with the slope up to the beach. The ledge has been replaced by a moat that is surrounded by landscaping and a railing (Figure 3).

There has never been a filtering system, but fresh water constantly runs into the pool. The water is tested weekly in compliance with the United States Department of Agriculture marine mammal regulations. After a water sample is obtained, the pool is emptied and cleaned.

Breeding Success and Rearing of Offspring in a Group of California Sea Lions (*Zalophus californianus californianus*). *Continued*

FIGURE 1. SAMPLE FEEDING DATA SHEET

RECORD OF SEA LION PUP FEEDING

DATE _____ TEMPERATURE _____

TIME _____ WEATHER _____

FOOD OFFERED _____ HERRING (H)
 _____ MACKEREL (M)
 _____ SMELT (S)
 _____ OTHER (O) _____

871198 "TWO SHOES" ID: " " LEFT HINDQUARTERS DOB: 5 JUNE 1987 DAM: "EP"	BEHAVIOR: _____ COMPETITION _____ ADULTS _____ PUPS _____ EATS FISH _____ (H) _____ (M) _____ (S) _____ (O) _____ SNIFF/IGNORE _____ (H) _____ (M) _____ (S) _____ (O) _____ PLAY/TOSS _____ (H) _____ (M) _____ (S) _____ (O) _____ MOUTHING/CHEWING/TRYING _____ _____ TO SWALLOW _____ (H) _____ (M) _____ (S) _____ (O) _____ NURSING _____ TIME OF DAY _____ _____ DURATION _____ _____ SLEEP/RESTING _____ LOCATION _____	COMMENTS:
871206 "LEFTY" ID: " " LEFT HINDQUARTERS DOB: 7 JUNE 1987 DAM: "ADRIENNE"	BEHAVIOR: _____ COMPETITION _____ ADULTS _____ PUPS _____ EATS FISH _____ (H) _____ (M) _____ (S) _____ (O) _____ SNIFF/IGNORE _____ (H) _____ (M) _____ (S) _____ (O) _____ PLAY/TOSS _____ (H) _____ (M) _____ (S) _____ (O) _____ MOUTHING/CHEWING/TRYING _____ _____ TO SWALLOW _____ (H) _____ (M) _____ (S) _____ (O) _____ NURSING _____ TIME OF DAY _____ _____ DURATION _____ _____ SLEEP/RESTING _____ LOCATION _____	COMMENTS:
871224 "RIGHTY" ID: " " RIGHT HINDQUARTERS DOB: 16 JUNE 1987 DAM: "COLLETTE"	BEHAVIOR: _____ COMPETITION _____ ADULTS _____ PUPS _____ EATS FISH _____ (H) _____ (M) _____ (S) _____ (O) _____ SNIFF/IGNORE _____ (H) _____ (M) _____ (S) _____ (O) _____ PLAY/TOSS _____ (H) _____ (M) _____ (S) _____ (O) _____ MOUTHING/CHEWING/TRYING _____ _____ TO SWALLOW _____ (H) _____ (M) _____ (S) _____ (O) _____ NURSING _____ TIME OF DAY _____ _____ DURATION _____ _____ SLEEP/RESTING _____ LOCATION _____	COMMENTS:

Breeding Success and Rearing of Offspring in a Group of California Sea Lions (*Zalophus californianus californianus*). *Continued*

TABLE 1. PUPS BORN IN 1987 AND 1988 AND MARKED

PUPS	MARKINGS

1987:	
LEFTY	SHAVED LEFT HINDQUARTER / FREEZEBRANDED / MARK LEFT HINDQUARTER
RIGHTY	SHAVED BEHIND LEFT FRONT FLIPPER / FREEZEBRANDED / MARK RIGHT HINDQUARTER
TWO SHOES	NONE / TWO MARKS 3.8 cm (1 1/2" APART) LEFT HINDQUARTER

1988:	
ROCKY II	SHAVED LEFT HINDQUARTER
NEMO	NONE
CHELSEA	SHAVED RIGHT HINDQUARTER

History and Care of Exhibit group

On 2-3 June 1981, three female California sea lions ("CC", "Collette", and "Adrienne") and one male ("Bandit") were released into the exhibit. All were wild-caught and estimated to be approximately two years old. One week later on 9-10 June, two more females ("Laverne", age 13, and "Shirley", age 11) were introduced to the group. The last animal added to the group was a 13-year-old male ("Moose") on 18 June. Laverne, Shirley and Moose had occupied the exhibit prior to renovation. Sixteen days after she was placed into the new exhibit, Shirley died.

Feeding of adult and subadult sea lions occurs twice daily at 0800 and 1500 hours from a feeding station located to the right of the dens (Figure 4). The diet consists of thawed mackerel and herring supplemented with vitamins which are listed in Table 2.

From time to time, California sea lions at the New York Zoological Park have been afflicted with a cloudy eye condition. Sometimes the eye will be kept closed. This is not unusual and has been reported by other institutions (Grisham, 198; Hall, 1977). "Lefty" developed an eye problem in August 1987 that persisted into November. It began as a swollen right eye which was treated topically with Gentocin®. Later on it became cloudy and she began to keep it closed. Examination revealed ulcerations on the cornea in the process of healing.

Reproduction

California sea lions have been a part of the New York Zoological Park collection almost continuously since 1899. Prior to renovation, there were only 20 recorded births which are listed in Table 3. Of these, six (30%) survived their first year and four reached an age considered sexually mature by Mate (1978). In the last seven years there have already been 16 births which are summarized in Table 4. Eight (50%) currently survive and 5 of 12 (42%) have lived more than one year. One of these has reached sexual maturity and has produced two surviving offspring.

Breeding Success and Rearing of Offspring in a Group of California Sea Lions (*Zalophus californianus californianus*). *Continued*



FIGURE 2. Sea Lion Exhibit at the N.Y.Z.P. PRIOR to Renovation.
(© New York Zoological Society Photo)



FIGURE 3. Sea Lion Exhibit at the N.Y. Z. P. AFTER Renovation.
(© New York Zoological Society Photo)

Breeding Success and Rearing of Offspring in a Group of California Sea Lions (*Zalophus californianus californianus*). *Continued*

FIGURE 4. SEA LION EXHIBIT - FEEDING STATIONS
(THOMAS et al 1986)

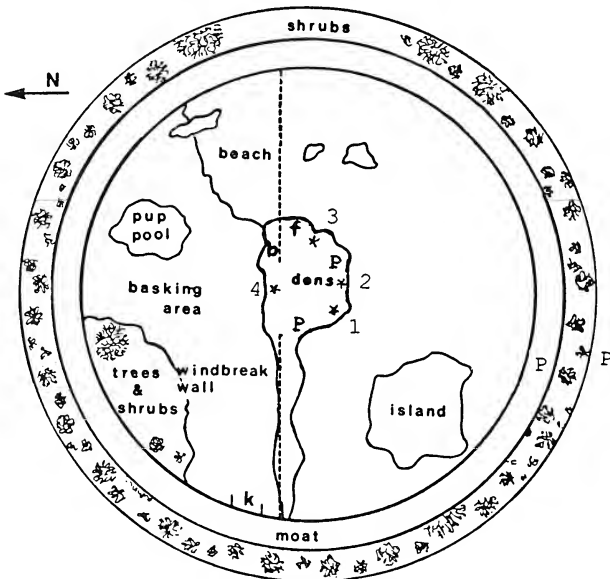


Fig.1. A sketch plan of the California sealion *Zalophus c. californianus* at New York Zoo. b. place of pup's birth; f. feeding station; k. keeper entrance; the dotted line indicates the position of the temporary 1-2m wiremesh fence used to separate the pup from the adults during the day. The outside of the enclosure is surrounded by a railing, and the moat wall is 1-2m on the inner side, 1-5m on the outer.

FEEDING STATION CODES: f - ADULT FEEDING STATION
 P - PUP FEEDING STATIONS

ADDITIONAL CODES: * - DEN ENTRANCES (1, 2, 3 and 4)

Breeding Success and Rearing of Offspring in a Group of California Sea Lions (*Zalophus californianus californianus*). *Continued*

TABLE 2. DAILY VITAMIN SUPPLEMENTS GIVEN TO CALIFORNIA SEA LIONS AT THE NEW YORK ZOOLOGICAL PARK

SUPPLEMENT	MALES	FEMALES	YEARLINGS
Sea Tabs	1 tablet	1 tablet	1 tablet
Thiamine hydrochloride 100 mg.	3 tablets	2 tablets	1 tablet
Vitamin E 100 IU	3 capsules	2 capsules	1 capsule
Meth-choline caps	1 capsule	1 capsule	1 capsule
Sodium chloride 2.25 g.	1 tablet	1 tablet	1 tablet

A combination of factors may have contributed to the greater number of births and percentage of survival. With improved husbandry and increased knowledge, captive animals are living longer (Grisham, 1984). Animals that live longer have the potential to produce more offspring. As the number of surviving offspring increases and reaches maturity, they themselves will contribute to the population.

Although the chances of survival are better, the mortality of pups is still high. In Peterson and Bartholomew (1967) only 24 corpses of approximately 250 pups in the wild were seen over a six week period during the breeding season. Taking into account the possibility that some were washed out to sea, the rate was still less than observed for northern fur seals (*Callorhinus ursinus*) in the Pribilof Islands. The mortality rate for northern fur seals ranged between 5-16% during the equivalent period. In the wild, female California sea lions and their pups remain near their rookeries year-round, although some from the California Channel Islands migrate south. Mature and subadult males migrate northward after the breeding season (Peterson and Bartholomew, 1967). Pregnant females will return to the rookeries shortly before birth. Births occur in late May, peak in June, and extend into July (Peterson and Bartholomew, 1967), after a gestation of 11 1/1 to 12 months (Nowak, 1983). Northern fur seals, which migrate alone or in small groups, also arrive shortly before parturition (Bigg, 1984). In experiments with captive fur seals, Bigg (1984) found that births may be triggered by the process of hauling out and other stimuli due to the presence of other seals at this time. Individuals that had constant access to haulout areas and other seals delivered stillbirths or premature pups in 10 of 12 cases. The incidence of stillborns or premature births did not decrease the longer the animals were maintained in captivity. Four seals, held under conditions they would be exposed to in the wild, had live births at the normal time.

Before June there had been only one live birth at the New York Zoological Park in the last seven years. That pup, which belonged to Adrienne, survived for only four days. All of the others belonged to CC, who unfortunately has never had a surviving offspring. St. Louis Zoological Park has had a similar experience. Pups born there in April or May were premature or stillborn (Grisham, 1984). Perhaps the mechanisms controlling fur seal parturition are acting here. There are several differences worth noting. Northern fur seals rarely breed in captivity, while California sea lions breed well. The breeding records of the present group of females has improved over the years, except for CC (see Table 4). CC may have a physiological problem which has not been investigated to date. Adrienne and Collette are wild-caught and may have acclimated to captivity. CC, who is also wild-caught, may not have adjusted and fits the reproductive pattern of captive northern fur seals.

Otten et al. (1979) mentioned that pups born into early June were considered premature at Marineland of the Pacific. They suggest competition among the group for food, and an exhibit that does not foster a relationship between mother and pup, as possible reasons.

Breeding Success and Rearing of Offspring in a Group of California Sea Lions (*Zalophus californianus californianus*). *Continued*

TABLE 3. BIRTHS PRIOR TO 1982 AT THE NYZP INCLUDING DATE AND AGE AT DEATH

ID	BIRTH DATE	DATE OF		AGE	REMARKS
		BIRTH	DEATH		
03824	26 JUN 1905	26 JUN 1905		0dy	DROWNED
03872	18 MAY 1912	21 MAY 1912		3dy	-
03882	29 MAY 1920	29 MAY 1920		0dy	DEAD IN POOL
03918	31 MAY 1935	30 DEC 1936		1yr 213dy	-
03938	16 JUN 1944	26 MAY 1947		2yr 344dy	INGESTED GLASS
03839	11 JUN 1945	19 JUN 1945		8dy	-
-	- 1946	- 1946		unknown	DID NOT NURSE
03944	10 JUN 1947	unknown		6yr 57dy	SOLD, 6 AUG 1953
03945	30 MAY 1948	31 MAY 1948		1dy	-
03946	10 JUN 1948	5 NOV 1952		4yr 148dy	-
03947	17 JUN 1949	unknown		5yr 4dy	SOLD, 21 JUN 1954
-	18 JUN 1949	19 JUN 1949		1dy	DID NOT NURSE
-	21 JUN 1949	21 JUN 1949		0dy	STILLBORN
-	- 1950	- 1950		0dy	PREMATURE
03948	9 JUN 1951	8 JUN 1952		364dy	TO HOSPITAL TO LEARN TO EAT
03957	31 MAY 1953	9 SEP 1964		11yr 101dy	-
03949	2 JUN 1953	10 JUN 1953		8dy	-
-	10 MAY 1975	10 MAY 1975		0dy	STILLBORN
-	11 MAY 1977	11 MAY 1977		0dy	STILLBORN
-	19 MAY 1981	19 MAY 1981		0dy	TRAUMA

REMARKS: yr - year, dy - days

Breeding Success and Rearing of Offspring in a Group of California Sea Lions (*Zalophus californianus californianus*). *Continued*

TABLE 4. BREEDING RECORD OF ADULT FEMALES ON EXHIBIT AT THE NEW YORK ZOOLOGICAL PARK FROM 1983 THROUGH 1988:

MOTHER	1983	1984	1985	1986	1987	1988
"LAVERNE" * *	4 JUNE FEMALE "EP" ALIVE***					
"ADRIENNE" ***	6 JUNE FEMALE LIVED < 1 DAY	17 MAY MALE LIVED 4 DAYS	5 JUNE MALE "ROCKY" ALIVE**	7 JUNE FEMALE "LEFTY" ALIVE***	9 JUNE MALE "ROCKY II" ALIVE***	
"COLLETTE" ***		23 JUNE MALE	16 JUNE MALE	16 JUNE FEMALE "RIGHTY" ALIVE***	19 JUNE MALE "NEMO" ALIVE***	
"CC" ***	8 MAY MALE	21 MAY FEMALE	30 MAY SEX UNKNOWN	13 APRIL MALE		
"EP" ***		STILLBORN	MUMMIFIED	STILLBORN	PREMATURE	
				5 JUNE FEMALE "2 SHOES" ALIVE***	9 JUNE FEMALE "CHELSEA" ALIVE***	

REMARKS: * DECEASED, 13 JULY 1983
 ** TRANSFERRED TO N.Y. AQUARIUM, 5 NOVEMBER 1986
 *** IN COLLECTION

Breeding Success and Rearing of Offspring in a Group of California Sea Lions (*Zalophus californianus californianus*) *Continued*

Mother-Young Relationship and Pup Development

"EP", the first pup born in the renovated exhibit in 1983, was subsequently pulled from her mother, Laverne, after nine days and was hand-reared. Laverne died one month later but her pup was successfully reintroduced into the group. This process was described in detail by Thomas et al. (1986) and will not be discussed here.

After parturition, females at the New York Zoological Park did not eat for approximately 1-5 days. A female at Stoneham Zoo showed no interest in food for five days, but the appetites of the other individuals were also depressed. It is thought that the quality of the fish could have been responsible (Crosbie, 1980). However, females in the wild are very protective of their young 2-4 days after giving birth and remain in almost constant contact with them (Peterson and Bartholomew, 1967). This has been observed in the female, Adrienne, in 1985. She did not venture into the water near the den (away from her pup) until the third day, and she returned each time the pup called. Several times she carried the pup by the nape of the neck. One time she brought it into the pool and assisted it to the rock island. In 1988, it was observed that Adrienne had even chased away and barked at her own pup, "Lefty", (now a yearling) who approached her day-old pup, "Rocky II", too closely. A female in the wild may not leave her pup in the first few days even if disturbed by man, but will carry or drag it in her mouth to safety (Peterson and Bartholomew, 1967). The strength of this bond is intense. CC gave birth prematurely this year on the rock island in the afternoon. The pool was drained so that the dead pup could be retrieved the next day. Sometime during the evening or into early morning, she moved the pup into the dens. The pup was taken under great protest from CC, who would not leave it. It would not be unreasonable to state that this devotion, demonstrated by the females CC and Adrienne, is a possible explanation for their lack of appetite.

As in the wild, protectiveness does not suddenly end after four days, but diminishes as the pup gains more independence. A physical act of aggression by EP towards Adrienne's pup, Rocky II, catalyzed by the presence of her own pup, "Chelsea" (then 6 days old), was witnessed. EP and Chelsea were on the rock island when Rocky II approached. EP lumbered over, gripped him mid-section, and tried to toss him into the water. The pup dropped from her mouth and scurried into the pool as EP tried to grab him a second time. Adrienne just swan nearby and barked.

Pups in the wild apparently can swim at birth, though poorly (Peterson and Bartholomew, 1967). Here at the Bronx Zoo, pups have been seen in the pool at 3-6 days. It is suspected that Adrienne's pup, Rocky II, was in the pool the day after it was born because it was seen completely wet. At St. Louis Zoological Park, one pup was seen in the water only three hours after birth and other observations were made at 2-3 days (Grisham, 1984). The incidence of drowning in the first few days in sea lions is not all that unusual (Spotte, 1979). The first pup born at the Bronx Zoo in 1905 drowned before it could be rescued (Crandall, 1964). To avert another tragedy, the pool was partly drained the next time, and the mother and pup were confined to a shallow area until the pup could swim well (Crandall, 1964). On another occasion, barricades also were tried in front of the den entrances, but after two days the mother picked up her pup and carried it over (Crandall, 1964).

Before renovation there was no shallow area or beach where pups could haul themselves out easily. San Francisco handled the problem of drowning by draining the exhibit in 1976-77 and gradually added water as the pups got older (Taylor, 1977). St. Louis added water to the exhibit so that the pups would have easier access to land areas (Grisham, 1984). "Shallow tidepools between the haul-out areas and the deeper parts of the swimming area" have been incorporated into the design of the Seal Island exhibit at Mystic Marinelife Aquarium to address the problem of drowning (Spotte, 1979). Ledges just below the water surface might be an additional solution.

As the pups perfected their swimming skills, they all developed a knack for going over the wall of the pool into the moat. Some, after several rescues by keepers, would go around the

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moat, up the stairs, and squeeze through the gate back into the exhibit by themselves. This problem was not anticipated initially, but the episodes provided an opportunity to sex, mark and weigh the pups. However, concerned with possible injury, this year it was decided to drop the water level enough to contain the pups, yet allow them to be able to haul themselves out of the pool. Regulation of the depth of the water would rely on striking a balance between the amount of water entering the pool against the amount allowed to leave by opening the drain.

When this method was tried on 16 June 1988, the pool level unexpectedly dropped halfway, so the drain was then closed and the water was turned on full force. Observations of the mothers and the pups was made. For approximately one hour, Adrienne and her pup, Rocky II, swam back and forth in front of the dens and briefly went to the shallow area near the beach. They then swam around the rock island with the pup eventually coming to rest on the stairs which lead up to it. During this period Adrienne barked incessantly, keeping close to her pup. The water level also created some difficulty for EP and her pup, Chelsea. Although EP could haul herself out, her pup could not. She insisted on trying to coax the pup out in front of the dens (where the wall was too high and vertical), instead of the beach area. As the pup tried to get up, EP would push her up with her muzzle. They swam back and forth in front of the dens. Sometimes EP would carry the pup in her mouth or push it along. The pup frequently went under or tried to ride piggyback. It seemed that everytime the pup headed towards the beach area, EP turned it around, although they did rest there briefly during the course of this episode. Chelsea, at one point, swam towards the stairs near Rocky II and Adrienne managed to get out of the pool and then settled next to Adrienne's pup. Adrienne was very tolerant, but a confrontation then occurred between Rocky II and EP. EP displaced Rocky II into the water while all Adrienne did was bark. The interaction appeared to attract the attention of the adult male, Moose, who approached the group and vocalized. The rest of the day EP and her pup settled down on the rock island.

Dropping the water level of the pool may help contain the pups, but it makes it more difficult for pups to haul themselves out of the pool. This may pose a greater risk of drowning at a young age. An all or nothing approach may be a good solution. No pups have suffered any apparent trauma from their falls. Two pups at San Francisco each dropped unharmed into an empty pool from a height of 1-1.5 m (Taylor, 1977). Perhaps a removable transparent wall could be installed temporarily in exhibits with moats. The wall could permit water to flow underneath and contain the animals; yet not obstruct the view of the public.

Weaning

At the Bronx Zoo the age at which pups have taken interest in solid food or were first observed eating food, and the time period in between, are recorded in Table 5. Rocky was transferred to the New York Aquarium before he was weaned, but he had already begun to play with fish at 64 days of age.

The process of weaning "Lefty", "Righty" and "Two Shoes" began in October 1987 as they neared four months of age. Throughout this period various fish were offered (as available) to the pups: whole capelin, smelts (whole or in pieces), lake smelt, squid, and pieces of herring and mackerel. A variety of fish was tried in the hopes of satisfying any preference they might have in the way of taste. It was hoped that cut fish might be accidentally swallowed. Usually only one type of fish was offered per feeding, but sometimes a combination was used. Another feeding station and feeding time of 1200 hours was established to maximize exposure to fish and minimize competition from the adults. Before renovation, competition was a problem so pups were routinely pulled from the exhibit at 10-11 months, weaned, then placed back into the group after the birth of a new pup. The position of the new feeding station varied with the position of the pups or the weather. One of four stations were used: the moat, top of the dens, the side of den 1 and the public area. The public area was utilized during the winter when ice made the other stations inaccessible (Figure 4).

For the first few days the pups looked at and sniffed the fish, and were not particularly

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interested. By the fourth day they were actively pursuing them. Once a pup had a fish, several types of behavior were observed: diving, toss and catch, and pointing the head upward, which looked as if the pup was chewing and trying to swallow.

On three occasions (22 March, 5 April, and 12 April), days which coincided with cleaning of the pool, the rate of water flowing into the pool while refilling was reduced. The increased visibility because of the shallowness made it easier to identify the pups and their activities, primarily whether or not they were indeed eating solid food.

The first confirmed ingestion of fish was on 1 April 1988, at the age of 303 days, by Two shoes. At the 0800 feeding while on the rock island, she picked up a smelt and ripped it in half by shaking her head. She pursued these pieces, broke off smaller ones and swallowed. She also tried to swallow a smelt whole. At the 1500 feeding she ate some pieces of mackerel.

Righty was the next to make the transition at 305 days on 7 April. Some concern was expressed over Lefty who appeared a bit thin at this time. She was finally noted eating herring on 28 April at 317 days. Holding the fish in her mouth, she shook her head side to side as Two Shoes had done. This effectively broke up the fish into more manageable pieces that she then swallowed. Each piece that she broke off was followed and the procedure repeated. One piece went over the wall into the moat. She rose up onto the wall and called at it. A keeper went down to retrieve it, but she had given up by the time the keeper reached it. Once the transition began, all the pups started to come to the adult feeding station. The other feeding station and the 1200 feeding time were abandoned because the pups were all able to compete successfully with the adults for fish. On 4 June, supplementation of fish with one Sea Tab® and one tablet of Thiamine hydrochloride (100 mg) began. The others: Sodium chloride (2.25 g), Vitamin E (100 I.U.) and Meth-choline, were added on 1 July. Once the pups were weaned, the supplementation with vitamins is important. Some species of fish, such as herring, contain the enzyme thiaminase, which breaks down vitamin B-1 and could lead to deficiency (King, 1983).

Nursing continued by Lefty and Two Shoes at least until the mothers gave birth again in 1988. Once the new pups arrived, the yearlings were rebuffed when they attempted to suckle. Collette allowed Righty to nurse on at least one occasion after having her new pup. At that time she was lying with her new pup, "Nemo", in front of dens 2 and 3. If Righty could not have access to a teat caused by a shift in position by Collette, she would protest and try for a better position. This caused Collette to rebuff her, especially if she would approach Nemo too closely.

The age at which weaning occurs is not known. Yearlings have been observed nursing in the wild (Peterson and Bartholomew, 1967). One female pup, "Benny", at the New York Zoological Park, continued to nurse for 17 months (Crandall, 1964). This can be detrimental to a new pup, captive or wild, who cannot compete with its older sibling. This has occurred at the San Francisco Zoo (Taylor, 1977). The yearling had to be removed from the group temporarily. Although Righty nursed after Nemo was born, the new pup did not seem to suffer. Monitoring this type of situation can be difficult. Young pups suckle more frequently. Nursing generally lasts approximately 30 minutes and may occur only once daily as the pup gets older (King, 1983).

This year's pups have already been spotted carrying parts of fish in their mouths. The earliest report was at the age of 37 days. Capelin is being offered to encourage interest.

Table 5 also includes data obtained from records kept by Tulsa Zoological Park (pers. comm.) and Welsh Mountain Zoo (Dinely, 1979 and 1981). The mean age, in days, which pups took an interest in solid food was 91 ± 31.78 days (sample size, $n = 7$). They began to eat at a mean of 244.7 ± 67.1 days ($n=7$). A mean of 153.2 ± 71.62 days ($n=5$) elapsed in between. The period of time in between interest and eating is much more consistent if "Tulsa 7152" is discounted. The question raised is whether or not this is an isolated case or if it occurs more frequently. Taking an early interest in fish did not mean a transition to solid food at an earlier age.

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TABLE 5. DATE AND AGE PUPS HAD FIRST TAKEN INTEREST IN FOOD, WERE FIRST OBSERVED EATING, AND DIFFERENCES IN AGE (DAYS) BETWEEN BOTH OBSERVATIONS AT VARIOUS INSTITUTIONS

INSTITUTION CODE	POP	DATE OF BIRTH	DATE OF 1ST INTEREST IN FISH	AGE (IN DAYS) OF 1ST INTEREST	DATE 1ST OBSERVED EATING	AGE (IN DAYS) OF 1ST EATING	DIFFERENCE OF AGE AT 1ST EATING MINUS AGE AT 1ST INTEREST (IN DAYS)
A	ROCKY	6/05/86	8/08/86	64	-	-	-
A	LEFTY	6/07/87	10/06/87	121	4/28/88	317	196
A	RIGHTY	6/16/87	10/06/87	112	4/07/88	305	193
A	TWO SHOES	6/05/87	10/06/87	123	4/01/88	303	180
A	ROCKY II	6/09/88	*	*	-	-	-
A	CHELSEA	6/09/88	7/19/88*	40*	-	-	-
A	NEMO	6/19/88	*	*	-	-	-
B	TULSA 6754	6/03/84	8/09/84	67	2/07/85	249	182
B	TULSA 7152	6/02/85	9/23/85	113	10/08/85	128	15
B	TULSA HUEY	5/27/86	12/4/86 TAKES HERRING READILY		1/23/87	241	-
C	SALTY	5/27/79	BEGINNING OF NOV' 79		11/06/79	170	-
C	CELIA	6/12/80	-	82	-	-	-

INSTITUTIONS: A - NEW YORK ZOOLOGICAL PARK
 B - TULSA ZOOLOGICAL PARK (personal communication)
 C - WELSH MOUNTAIN ZOO (DINELEY 1979, 1981)

REMARKS: * - ROCKY II OR CHELSEA WAS OBSERVED WITH FISH ON 7/16/88 (37 DAYS),
 WITH ONE UNIDENTIFIED PUP OBSERVED ON 7/29/88 (50 DAYS)

Sexual Maturity

No pups were born in 1982. According to Peterson and Bartholomew (1967), female sea lions come into estrous approximately two weeks after parturition in the wild. This has also been observed in captive animals (Grisham, 1984). At Hannover Zoo, estrous (lasting 2-4 days) has been reported to occur 4-5 weeks after giving birth (Dittrich, 1983). Laverne had a pup on 19 May 1981 that died the same day. She was transferred to the exhibit on 2 June, 14 days later, just as she should be coming into estrous. Moose was not put in with the group until 18 June or 30 days after Laverne gave birth. The period of estrous would have passed. If she did come into estrous then, it is possible that she could have been bred by Moose based on Dittrich (1983). Conception simply may not have occurred. The rate of

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conception for the species is unknown (Ronald et al., 1982).

The age of sexual maturity has not been established but according to Mate (1978), females usually breed at age 4 or 5. There have been earlier reports. EP and two other females (mentioned by Takei and Yasui, 1980) bred at the age of 3. CC, Collette, and Adrienne were only two-years-old in 1981 and therefore were too young to breed.

The dominance and relative reproductive success of Moose and Bandit are uncertain and need to be investigated. According to Mate (1978), males in the wild may be mature at age 4 or 5 but are unable to breed until the age of nine when they are larger and therefore better able to defend a territory.

According to Peterson and Bartholomew (1967), the establishment of territory begins in May and extends into August. It is most intense during later June and early July. How the first territory is established is not known, but once established, the male can only be displaced by fighting. Territories are maintained approximately 14 days. The male advertises his occupation through vocalization and display. The most successful have access to water which is necessary for thermoregulation. After this period, the bull will go back to the sea to feed so it is possible for a series of bulls to hold the same territory and breed. A bull which does not hold territory also has an opportunity to breed. He may slip in unnoticed as the other male sleeps (Peterson and Bartholomew, 1967).

A four-year-old male was observed copulating with females in an occupied territory while the male slept (Odell, 1981). Copulation occurs on land as well as in water. The females are transient and not held by the male in his territory. Once successful copulation takes place, the females lose interest in any further sexual activity. However in Odell (1981), a female was observed to copulate with two territorial bulls successfully. The female is the one who solicits the male and the one who breaks it off.

The activities of Moose and Bandit seem to suggest territoriality, but it is occurring late in the breeding season. During late July into August and occasionally September, there have been reports of interaction described as vocalizing, pushing, sparring, and fighting. On 4 August 1985, Moose and Bandit were very vocal. The next day Bandit was pursuing the females. Oddly, between 6-12 August, Moose spent considerable time in the den, while Bandit remained outside and vocalized. Since behavioral studies have not been conducted, definite conclusions cannot be made. It is not known if these displays are boundary rituals; if Bandit is trying to displace Moose from a territory; or even if Bandit has occupied the dominant male position. Moose is now 20 and Bandit is nine. Confrontations can be expected to occur more frequently as Bandit approaches the size of Moose. Schusterman (1968) has demonstrated this in experiments with three 6 year-olds in captivity.

In July 1983, Bandit (then 4 years old) was observed with Moose driving CC. Copulation was reported between CC and Bandit on 21 and 30 July. Three years later (in 1986), Bandit was observed breeding CC again on 6 August. It is unusual that Bandit has been seen breeding only CC. It would be interesting to see if he is copulating with CC (or the others) in his established territory, or taking the opportunity in Moose's area when Moose is not looking.

The observations above of CC and Bandit in late July and early August do not conform with the usual breeding period. If CC indeed was in estrous on those dates, it suggests that there may be a physiological problem, since estrous would be occurring after the expected time. The elapse of a week between copulations in July 1983 also supports this, since it does not fit the pattern of estrous previously described.

Summary and Conclusions

It is important to be able to identify individual sea lions easily so that anyone can accurately keep track of progress and problems.

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The rate of survival for pups has increased since renovation and is a reflection of the knowledge obtained and the improvements in husbandry over the years. Mortality for pups is still high, which may be the result of exhibit design, competition, or the disruption of the mechanisms involved in the birthing process. Survival of pups has increased from year to year, suggesting acclimation to captivity.

Pups are poor swimmers at birth and drowning is common, so easy access to land areas is very important. The renovated exhibit is successful in this respect, providing a tidal pool and swimming area that slopes up to the beach area. A ledge just below the water level might also be helpful in areas where there are vertical walls. A temporary retaining wall should be erected to contain pups and avoid possible injury in moated exhibits where pups are likely to wander over the edge.

For the first time, pups have been weaned without intervention. This was not achieved in the old exhibit because of competition. An additional feeding station should be used to assist the pup weaning. The original feeding station will hold the attention of the adults while the keeper at the other station can concentrate on the pups. This will reduce adult-pup competition and may facilitate weaning by providing a greater opportunity to play with fish. The age at which weaning occurs is highly variable. It is hoped that the data collected could be used as a guideline for future pups. Nursing frequencies, duration and competition are still very important activities which should continue to be monitored.

The dynamic roles of Moose and Bandit need investigation. Presently, they are co-existing, but conflicts can be expected to escalate as Bandit ages. If the exhibit is large enough to support two territories, they might continue to remain together. If not, it still may provide sufficient resting areas where they may retreat from each other to avoid constant friction.

It is important that these studies of the sea lions in its captive environment continue. The renovation of the sea lion exhibit has indeed improved or solved some problems, but many more questions remain unanswered.

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Products Mentioned in the Text

1. Gentocin®: gentamicin sulphate, a-tibiotic, manufactured by Schering Veterinary, Kenilworth, NJ 07033.
2. Meth-choline caps: manufactured by Interstate Drug Exchange, Inc., Plainview, Long Island, NY 11803.
3. Sea Tabs® vitamin and mineral supplement: manufactured by Pacific Research Labs., Inc., P.O. Box 1877, El Cajon, CA 92002.
4. Sodium chloride: manufactured by Eli Lilly and Co., Indianapolis, IN 46285.
5. Thiamine hydrochloride: manufactured by Interstate Drug Exchange, Inc., Plainview, Long Island, NY 11803.
6. Vitamin E: manufactured by Schein Pharmaceutical, Inc., Port Washington, NY 11050.

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Strategies for Exhibit Plantings for Large Felids

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At the Washington Park Zoo (WPZ) we look at exhibit landscaping as "warfare gardening", that is we use various "battle plans" to give us a strategic advantage over the destructive potential of large felids. We have learned to live with acceptable losses and not surrender even when things look desolate. We have tried to pursue strategies that use the fauna and flora as components of the same exhibit rather than treating the cat as the enemy, to be kept at bay from greenery by such extreme measures as hot wire, chainlink fencing, and moats. We strive to have the plants and exhibit residents interact in a positive way to encourage activity.

Keepers and gardeners have to be willing to work closely together to produce a victorious landscape plan. Keepers know the individual cats, circumstances, and what combination of strategies will be most likely to succeed. The gardeners have the knowledge of plant needs and what species will fair the best where.

We have relatively small exhibits without much open ground. In the past exhibits were fairly barren, making any newly introduced plants vulnerable to immediate detection and destruction by the cats. Getting greenery established has been difficult, but over the years we have developed and tested various methods that have established extensive vegetation in our big cat enclosures. We have found that hot wire for plant protection is not only ugly, but potentially dangerous. It also limits the usable exhibit space for the cats, and is a maintenance headache; in addition it frequently plain doesn't work. We have had disastrous results using hot wire with clouded leopard (*Panthera neofelis*) and lions (*Panthera leo*), and only marginal success with Siberian tigers (*Panthera tigris altaica*) and leopards (*Panthera pardus*). We prefer a more "natural" approach that allows the cats to interact with their exhibit.

Most of our large cats are middle-aged or older which is a strategic time to do a lot of landscaping, getting plants well established before future, younger, more rambunctious cats are introduced. We give our cats a lot of clawing and chewing opportunities in the holding area, to get as much "out of their systems" as possible. Suggested distractions to keep cats interested in something other than newly planted vegetation are: bones, ox-tails, crickets, and fresh branches or logs.

Large angular boulders physically keep the animals away from plantings and prevents soil compaction. Small decorative vegetation can be planted in the crevices between rocks, and grass can gain a strong foothold at the base of the rocks. Thorny or other unpleasant plants can also be used to protect more vulnerable vegetation. Hawthorne (*Crataegus sp.*), pampas grass (*Cortaderia sellona*), and barberry (*Berberis sp.*) have all been successfully used for this purpose. Controlling which areas are heavily used can help establish vegetation. "Seeding" certain areas by feces placement can persuade some cats to use those locations for defecation. Water drips and muddy spots can make other spaces less appealing for heavy use. Placing bones or other desirable objects at specific locations can encourage the use of that area. The placement of heat pads, shade, and other sheltered areas can also help with planning exhibit landscaping strategies. The plantings themselves can provide a wide variety of partial shelter and visual barriers.

Odors can also be a way of modifying an animal's behavior to give vegetation an improved chance of survival. We conducted a study with our clouded leopards to see if handling the

Strategies for Exhibit Plantings for Large Felids, Continued

plants made them any more likely to be targets of abuse than if they had been rinsed off and allowed to "air" for at least an hour or more before giving animals access to the enclosure. The handled plants received most of the damage. There is a new product that has potential called RO*PEL®, it is a nontoxic chemical taken into the plant's vascular system, making it unpleasant to taste for a wide variety of species. It is as yet untried at this zoo.

An animal's enclosure is usually so static that any new addition causes considerable attention. If an effort is made to frequently move "furniture" and add new objects it won't be such a big deal when a few plants are slipped in. Making unnecessary changes in a cat's environment regularly cannot only help increase the animal's activity level by providing a more stimulating environment, but it also assists the cat's ability to cope and adjust to the necessary changes when they arise. Another approach is to wait until the weather is unattractive for exploring, such as during heavy rain or excessive heat. This keeps the cat in sheltered areas until the plants aren't as novel.

All species proposed for planting in exhibits must first be approved by our veterinarian to make sure none are toxic. The species and quantities of vegetation chosen have had a great deal to do with how successful we've been. Sometimes we've done what we call "overkill", planting excessive amounts of vegetation gambling that some will survive the onslaught of trauma inflicted by exhibit residents. Certain cats seem to especially enjoy destroying certain species of plants. Our lioness has a fondness for yucca (*Yucca sp.*) and our cougars (*Felis concolor*) loved vine maple (*Acer circinatum*). We have employed this to our advantage by using these species to distract them from the plants we wanted to establish. If they pulled up a plant we just kept sticking it back in, even if it was dead, eventually they got bored with it and in the meantime it has distracted them from the other plants. Dead trees and other dead vegetation have been left in the exhibits as natural looking furniture, barriers to protect other living plants, and to be used and abused by the residents.

Certain species can be "sneaked" into the exhibit unnoticed until they slowly push up through the ground. Bulbs such as day lilies (*Lilium sp.*), tubers such as Mexican bamboo (*Polygonum cuspidatum*), seeds such as grass and mint, and root balls such as bamboo and elderberry (*Sambucus sp.*) have worked well at WPZ. New plants can also be hidden "inside" older, more established plants.

Plants with aversion qualities such as thorny barberry, locust (*Robinia sp.*), and hawthorne, cutting pampas grass and palms, or smelly, bad tasting cedar (*Cedrus sp.*) and juniper (*Juniperus sp.*) can be good choices for first exhibit plantings to get things started.

Weeds can be a gardener's best friend. There are some plants that just can't be killed. Mexican bamboo is great and gives a jungle effect; morning glory (*Ipomoea sp.*) and mint are others. Care needs to be taken not to let them get out of hand and strangle other plants, and so they need to be somewhat contained. There is also a problem with exhibits looking too similar if these plants are used too much.

Vegetation planted outside the enclosure and allowed to grow into it can have beneficial effects such as shade, visual barriers for the cats, and perceptually breaking up cement walls. There is a lot more flexibility in the selection of species used in these areas and the plants have a much better survival potential.

Care of the plantings is as important as getting them established in the first place. Our exhibits are evaluated for pruning needs at least once a month by the keepers. Pruning stimulates growth and controls the growth pattern adding to plant survival potential. Leaving lower branches in place keeps cats away from the trunk or pruning at sharp angles can be a deterrent to the cats. Pruning also promotes visual avenues for the public to view the animals to the best advantage.

Survival rates of plants increased when underground sprinkler systems were installed at our zoo. These were simple, easy to set up and maintain, and can also be used to animal management advantage. For example, if a cat refuses to come in the sprinklers suddenly turning on can be a good persuader.

Strategies for Exhibit Plantings for Large Felids, *Continued*

We have won many battles using different combinations of these strategies depending on the specific situation. It's been a continuous struggle to maintain a balance of dying to living vegetation, but the greatly improved appearance of our exhibits and the more pleasant and stimulating environment created for the cats in our care makes it all worthwhile.

Acknowledgments

We would like to especially acknowledge Mike Watson and Dave Fischer, along with the rest of the gardening staff at Washington Park Zoo, without whose help, enthusiasm, and skill we wouldn't have been nearly as successful. We would also like to thank Roland Smith who got everything started when he was senior feline keeper.

Products Mentioned in the Text

RO*PEL®: Bird and mammal repellent
Burlington Scientific Corp.
100 Fairchild Avenue
Plainview, NY 11803



Rethinking The Childrens' Zoo

By

*Jeanne Grossmayer, Lead Keeper
The Phoenix Zoo, Phoenix, AZ*

Historically, Mother Goose and Old MacDonald's Farm have been the pervasive theme of many Childrens' Zoos. The Phoenix Zoo was no exception. This area was high in entertainment and nearly devoid of any educational information for zoo-goers. It was also an area where, keepers assigned there, hoped to "pay their dues" and move into the more respectable areas of zookeeping.

After nearly thirty years when it became a necessity to renovate this area, Phoenix set about to change both their approach and attitude on what a Childrens' Zoo should provide for the public, the keeper, and most importantly the animals to be displayed there.

The design and education departments worked together and determined seven points of consideration that would be the basis of the change and what methods would best achieve those changes.

1. Compatibility of Exhibits to Specimen

As space was limited in this area, the plan was to display a cross-section of the animal kingdom, including exotics, but to use species of a diminutive size. Thus, the exhibits could be acceptably smaller and the entire area could be scaled down in relation to a child's view of things.

2. Husbandry Management

Rather than find just any small animals for the scaled down exhibit size, the Animal Department chose species of animals that were interesting, appealing to the public, and also small. This would illustrate body size adaptation and, in the case of some, hold

Rethinking the Childrens' Zoo, Continued

conservational importance in the breeding of the animal, such as the Goeldi's Monkey (*Callimico goeldi*), the American Peregrine Falcon (*Falco peregrinus*), and the Pileated Gibbon (*Hylobates pileatus*). In the case of other animals such as the Raccoon (*Procyon lotor*), which are popular with the public but undesirable to breed, individuals of the same sex were chosen to represent the species. We are designated as a non-breeding holding facility by SSP for the Golden Lion Tamarin (*Leontopithecus rosalia*) and so display 0.2 of this animal on an educational status. We currently display a troupe of 2.3 Common Squirrel Monkeys (*Saimiri sciureus*), however we are looking into the possibility of the acquisition of a rare species of this animal.

Though it is sometimes evident that success in breeding can occur in spite of the conditions an animal is placed in, it is felt that the births recorded in the first year of the New Childrens' Zoo can be attributed in part to their new surroundings. Among these births are: 0.0.1 Pileated gibbon, 0.1 Goeldi's monkey, 1.0 Red-handed tamarin (*Saquinus midas*), 1.2 Reeves muntjac deer (*Muntiacus reevesi*), 0.0.1 Toco toucan (*Rhamphastus toco*), and 0.0.10 Lady Gouldian finches (*Chloebia gouldiae*).

3. Space and Personnel Utilization

Again, limited space determined what species would best be displayed here and how best to design the exhibits for keeper maintenance. Rather than use a large area to display one animal, such as White-tail (*Odocoileus virginianus*) or Fallow (*Dama dama*) deer, the same amount of space was able to very comfortably accommodate a split exhibit consisting of Muntjac deer and Tammar wallaby (*Macropus eugenii*) and served to exemplify the diminutive size of these animals to the visitor.

The Tamarin complex consists of three exhibits. Red-handed, Golden lion tamarins and Goeldi's monkeys were chosen to be housed here rather than a single larger primate display. These exhibits are much higher than wide and make excellent use of the limited space. It also allows the more vertical mobility of these animals to be well displayed. The Muntjac/Wallaby and Tamarin exhibits have connecting enclosed nighthouse/keeper access areas that make servicing easier with fewer stops. The Muntjac/Wallaby have off-exhibit animal holding yards and sink-counter, storage and bathroom facilities for the keepers' use.

The nursery, with its two display windows and outside holding yards on either side, provide an area to exhibit infants or to temporarily hold animals for public viewing. The kitchen area is the center of the keepers' daily activities. Here some diets are prepared, grains are stored and animal or work changes in the area are posted.

At the insect house there is a sink-counter area and storage space. The keepers also have a desk to work from which is a first in any keeper area.

Consideration to the visitor has also been a factor in the space utilization. Walkways were made wider to accommodate strollers and wheelchairs. Small rest stops with benches and grassy areas are set up to make viewing into nearby enclosures easy. There is also a smaller version of the main zoo concession stand, a gift shop and restrooms.

4. Educational Value

The plan was to keep this area of the zoo fun for children yet take full advantage of the opportunity to teach them about the animals they will encounter without being condescending or anthropomorphic. As an example, the five bird species on display represent waterfowl, raptor, hook-beak, fruit-eater and seed-eater. They were strategically chosen and grouped for their educational impact in demonstrating varying adaptations of animals. They are placed in a semicircular grouping of exhibits which enables a parent or teacher to literally walk the child through a lesson on how and why birds look different from one another.

Rethinking the Childrens' Zoo, *Continued*

There is a small four-windowed display which depicts the evolutionary process of fish, amphibian and reptiles and displays the variations of insects.

Education was extended into the playground area with graphics and structures that depict the activities of some animals and provide the children an opportunity to imitate an animal in action. There are "monkey bars" with a graphic that explains brachiation of some primates. A tunnel simulates the preferred mode of travel and living of Prairie Dogs (*Cynomys ludovicianus*) and a tree hollow serves to show a refuge of choice for raccoons.

Two lecture pavilions were included to supplement viewing of exhibited animals. These give the public an opportunity to touch and handle live specimens. The ability to actually "touch" an animal always incites the interest of the zoo-goer and the well-trained lecturer is able to provide immediate answers to their questions. These facilities add to the fun/learning theme.

5. Innovation

Without a doubt, the most integral aspect of change in the Childrens' Zoo was the creation of the graphics. The concept, first developed at the Phoenix Zoo, was worked on in a year-long graduate student class project with the Arizona State University Graphic Design Department. The exhibit graphics are a "severe slab" design, which is somewhat monolithic in appearance. They are strikingly colorful. Constructed of three removable levels, the top section identifies the name of the display animal. The center section gives additional information for similar species and/or the family of animals. The bottom graphic gives a statement or challenges the young visitor with a question that relates to the display animal.

Rather than written signage giving direction to enclosures, looming colorful structures shaped like the animal guide the way to the exhibit without the obvious and anthropomorphic ploy of an outstretched finger.

Instructional graphics, rather than "don't signs" are used in an attempt to reason with the child rather than to scold them about acceptable behavior. For example, one sign asks them not to pick the flowers so that the animals may enjoy them too.

6. Aesthetics

The type of landscaping in the Childrens' Zoo serves both to soften the structural elements and to create habitats within the displays. Where it was possible, vegetation endemic to the animals' natural habitat was used. Passion flower (*Passiflora alata*), Rubber trees (*Ficus elastica*), and Coral trees (*Erythrina humeana*) occupy the tropical bird exhibits. The Tammar Wallaby exhibit includes Cassia (*Cassia phyllodinia*), Bottlebrush (*Callistemon viminalis*), Acacia (*Acacia cultriformis*), and is bordered with Eucalyptus trees (*Eucalyptus torquata*). An excellent job of creating safety and comfort zones was done through the landscaping of the exhibits. The planting of deciduous trees and vines within enclosures creates shade in the summer and allows the sun's warmth in winter. The vining also aids in obscuring cage wire. The rock and flower gardens are strictly for their visual appeal and do not overwhelm the animal exhibits in the area. The lushness of vegetation within the New Childrens' Zoo results in temperatures that are sometimes as much as 20 degrees lower than that of surrounding areas.

Much of the exhibit rockwork was specially designed to compliment the natural buttes that exist just beyond the Childrens' Zoo perimeter. This serves to blend the whole area into its surroundings.

There is a stream with several waterfalls that flows through some exhibits creating a pleasant sound and serving a useful function as a water source for the animals along its pathway.

Rethinking the Childrens' Zoo. *Continued*

7. Safety

Concern for the public's safety is, of course, an issue dealt with in all areas of the zoo. The design and choice of playground equipment and its installation was of particular concern in the New Childrens' Zoo. Sand bases were used around most of the structures that involved climbing and jumping. The innovative wheelchair swing is accompanied by instructional graphics on its use. Throughout the rest of the area, guardrails and disabled access were designed to meet all city and federal guidelines.

Working from the seven points of design consideration, the New Childrens' Zoo has resulted in a new and positive approach for our zoo. It has become an unacceptable mentality to display animals arbitrarily, with little or no educational importance attached to them, "because after all, it's just the Childrens' zoo".

The public experience is now one that is interesting, revealing, appealing and safe.

For the keeper, it is no longer the "Siberia" of the zoo where one spends their time in hopes of an early release or worries of doing a life sentence there.

Like any other new approach in concept, the New Childrens' Zoo did not come through without its problems. There are some design flaws that include nighthouses that take on water in heavy rains. Some water valves are set below ground level and require the keeper to be on all fours to reach them. Frequently, the wallabys don't appear to be present in their enclosure because of their few number. Breeding the two we have, both males, has proven a particular hardship.

The peregrine falcon graphics, while very informative on raptors, still does not explain to the children why these birds are tearing up dead chickens in their enclosure. Some vegetation grows up and others fall down.

These are all obstacles that can be rectified or at least not repeated. None of these flaws detract from the Phoenix Zoo' success in presenting a new approach to other facilities and to the public of what a Childrens' Zoo can be with thought, effort and planning.

Acknowledgments

This paper is dedicated to Becky Nankivell of the Arizona Primate Foundation, without whose inexhaustible patience, I would still be desperately pounding the "Help" key of this !#?* word processor. And to Jo Fritz, whose editorial skills kept it from reading like a cartoon strip and to Paul Fritz for moral support.



Giant Pandas: Black and White in a Gray World

By
Richard Block
Director of Public Programs
World Wildlife Fund



With all the furor over short-term panda loans in the U.S., it might be useful to look at the issue from several perspectives in order to understand better this complex issue. World Wildlife Fund has been a central character in the panda battle and has developed its position based on an investigation of a number of the challenges to giant panda conservation. There are no simple solutions to these challenges which involve people and resources from around the world.

On the Brink of Extinction

The giant panda (*Ailuropoda melanoleuca*) is one of the most critically endangered species on the planet. The prospects for its survival, in the wild and in captivity, are exceedingly grim. According to a 1976 survey, fewer than 1,100 giant pandas survive in remote, mountainous regions of China, about half of them in protected areas. The wild population is fragmented into small, isolated groups, whose reproduction is compromised by increasingly limited mate selection and possibly, in the long run, by inbreeding. Wild pandas continue to be threatened acutely by loss of habitat to forestry and agriculture.

In recent years, western researchers and Chinese scientists have suspected that the most immediate threat to wild pandas was poaching. In February, 1988, Chinese authorities announced the recovery of 146 giant panda pelts--equal to about one-seventh of the remaining population (Cheng Hong, 1988). Most of the animals had been killed by poachers and would eventually be smuggled through Hong Kong where they can fetch thousands of dollars in the international black market.

An estimated 80 pandas--a complete count and description of the animals have not been available--are in captivity in Chinese zoos and other institutions. Eighteen pandas are in zoos outside China. (The only permanent exhibit of pandas in the United States is at the National Zoo in Washington, DC) Generally speaking, captive breeding efforts have yielded poor results to date. In China, captive propagation remains uncoordinated and is not sustaining the captive population, much less providing animals for reintroduction to the wild. An estimated 25-30 giant pandas have been captive-bred in China since 1970.

Panda Conservation Efforts

China has made a national commitment to conserving the giant panda. The Chinese established a system of 12 natural reserves in the early 1970's to set aside habitat that would protect the panda and other wildlife. The Chinese have spent an estimated \$25 million to conserve pandas, a considerable amount of money in light of their pressing social needs.

At the invitation of the Peoples Republic of China, World Wildlife Fund, and WWF organizations in 22 other countries around the world, began a collaborative conservation project to save the giant panda in 1980. WWF has since committed over \$4 million for scientific research on wild pandas, development of management plans for panda reserves and an overall plan to save the species, for anti-poaching activities, and for training of Chinese veterinarians and reserve managers. In addition to other support, WWF provided half the cost of building China's principle captive breeding station which is at Wolong.

Giant Pandas: Black & White in a Gray World, *Continued*

China also has cracked down on poachers by stiffening criminal penalties and arresting dozens of offenders. In the past year, the government authorized life sentences and even the death penalty to deter would-be poachers. Despite these efforts, however, the giant panda is fast approaching extinction.

WWF has welcomed and encouraged the support and technical assistance of other institutions in panda conservation efforts in China including Wildlife Conservation International-New York Zoological Society, The National Zoo and other members of the AAZPA, the International Union for the Conservation of Nature and Natural Resources (IUCN, an international consortium of some 500 private and governmental organizations), and the London Zoo.

WWF, the AAZPA, and most international conservation organizations became alarmed at the growing number of institutions that have chosen to become involved in panda conservation by arranging short-term exhibition loans of giant pandas. (China halted its gifts of breeding pairs of pandas in 1985.) Most of these institutions are U.S. zoos with no prior interest or involvement in panda conservation.

Endangered Species Act and Giant Pandas

The U.S. Endangered Species Act protects the giant panda as an endangered species. The Act prohibits the movement of endangered species except "for scientific purposes or to enhance the propagation or survival of the affected species". Since "scientific purposes" and "propagation" have been eliminated in the contractual arrangements with the Chinese - the loans are for exhibition only - the legislation would require that the loan enhance the survival of the giant panda. There is no evidence that the loans have actually enhanced the survival of the species and the cumulative effect of the loans has not been evaluated. Each permit application has been considered for its individual merit, but has not been viewed in light of the increasing number of loans and what potential threats this trend might pose to the species.

CITES and Giant Pandas

The giant panda was included in Appendix II of the Convention on International Trade in Endangered Species (CITES) in 1983 and was transferred to Appendix I in 1984. Technically, therefore, pre-Convention or captive-bred specimens may have been exempt from the provisions outlined for Appendix I specimens.

The CITES Secretariat notified the parties to the Convention (95 countries) about the panda situation and issued the following statement:

"Because of the special nature of the giant panda, the Secretariat recommends that all giant panda specimens be subject to Appendix I criterion. Further, the Chinese government is urged to no longer allow zoos to capture or take any wild pandas and that the number of exhibition loans be kept to a bare minimum. To reduce the risk of using breeding age adults for exhibition loans, only those specimens that are either too young, too old, or otherwise unsuitable for breeding programs be loaned.

"Finally, the Management Authority of the importing country must be satisfied that the specimen is not to be used for primarily commercial purposes." (CITES Notification No. 477, 23 May 1988)

Gifts of State

Pandas have always represented friendship to the Chinese people. As such, pandas have been given as state gifts to other countries for hundreds of years. The United States was given a pair of pandas, Hsing Hsing and Ling Ling, in 1972. Other countries which still have these national gifts include Mexico (1975), Japan (1980), West Germany (1980), Great

Giant Pandas: Black & White in a Gray World. *Continued*

Britain (1974), Spain (1978), and France (1973). Following the bamboo die-off in the early 1970's, China discontinued the program of using pandas as national gifts and initiated short-term exhibition loans.

Rapid Increases in Short-Term Loans

For several reasons, these loans have become a matter of great concern to international conservationists, especially panda experts within and outside China. First, the number of loans has snowballed. In 1984 and 1985, the Chinese government allowed only one pair of pandas each year to travel outside China to the West for exhibition. The first pair, in 1984, was exhibited at the Los Angeles Zoo in conjunction with the summer Olympic Games, and then traveled to the San Francisco Zoo for three months. The Metro Toronto Zoo hosted a pair in 1985. In 1986, two pair were sent to European zoos (Dublin, Ireland and Sweden).

The number of pandas on tour jumped to four pairs in 1987, two pairs to European zoos (Antwerp, Belgium and The Netherlands) and two pair to U.S. zoos (San Diego and Bronx). In 1988, the potential number of loans was six pairs: Calgary Zoo, Toledo Zoo, Busch Gardens, Australian/New Zealand zoos, Michigan State Fair, and Zoo Atlanta. And the problem promised to get worse. A Chinese official informed AAZPA that over 30 U.S. institutions had inquired about short-term exhibit loans. Exhibition loans have become "a scramble by American zoos to borrow rare giant pandas from China as a way to generate large crowds..." (Boffey, 1988). It is possible that in 1987 and 1988, about 25 percent of China's captive panda population would have been shipped for temporary exhibit.

Breeding Age Pandas on Tour

The explosion of short-term panda loans has been aggravated by another disturbing development: more and more of the touring pandas are of breeding age. The female panda loaned to the Bronx Zoo in 1987 actually went into her estrous cycle while on exhibit. The two pandas now in Toledo are of prime breeding age, come from a captive breeding facility, and were moved during the breeding season. The two pandas the state of Michigan proposed to import in July were to be of breeding age. If the Fish and Wildlife Service had approved Michigan's exhibit, five of the six pandas most recently imported into the U.S. would have been of breeding age. Of the earlier loans, both pair in San Diego and Toronto were of breeding age. An attempt to switch animals at the last moment for the Calgary loan would have placed breeding age animals in that Canadian institution as well.

Money and Visitors Key Incentives

The tremendous amount of money generated by short-term panda loans is undeniable. A six-month exhibit at the San Diego Zoo last year reportedly increased attendance by 35 percent and boosted revenues by more than \$5 million. The Toledo Zoo expects to generate over \$3 million in revenues through admissions, souvenir and concession sales, and related fund raising activities--enough to cover all costs of the exhibit. A substantial share of those costs represent capital improvements at the zoo that have nothing to do with panda conservation. "The Toledo Zoo clearly saw the pandas as a way to increase attendance, attract new members, generate revenues to pay for a permanent primate exhibit, and place the Toledo Zoo on the 'map' for zoological parks..." (Boffey, 1988).

The economic incentives go far beyond the host institution. In the case of Toledo, the city stands to gain "at least" a \$77 million windfall" from the visit of Le Le and Nan Nan (Towle, 1988). The estimate of the indirect economic impact on the community was developed by the Greater Toledo Office of Tourism and Conventions. These community-based financial incentives can put additional pressure on a zoo director.

Contribution to Conservation

Typically, the Chinese institutions which lend the pandas receive a donation equal to about 10 percent of the revenues derived from an exhibit. In the case of the Toledo exhibit, the value of the donation is said to be \$300,000, but this could increase with the extension of an

Giant Pandas: Black & White in a Gray World. *Continued*

additional 100 days on the loan. The Bronx Zoo contribution to the Chinese totaled \$630,000 for their six-month loan. Zoo Atlanta's agreement, signed on 9 October, 1987, was for \$300,000. The Calgary Zoo loan, which extended from 10 February, 1988 through September 1988, provided for a \$500,000 (CDN) payment to the Chinese. The 1987 loan to the Netherlands was supposed to earn \$120,000 (US) for the Chinese Association of Zoological Gardens (China Daily, 4/7/87).

It's not always essential to exhibit pandas in order to raise funds for conservation. WWF has raised funds from special programs, appeals, and direct mail campaigns to support panda conservation work since 1980. Michigan's Department of Natural Resources initiated an "Adopt a Panda" program in April 1987 to help raise funds for the Chinese.

Panda Exhibits Educate the Public

Borrowing institutions frequently lay claim to educating hundreds of thousands of visitors about conservation of giant pandas and other endangered species because of the large crowds attracted by the pandas. None of the institutions exhibiting pandas on a short-term loan has conducted any evaluation of the educational impact of the panda exhibit. It is assumed that great numbers of people filing past graphics, videos, and displays automatically raises conservation consciousness and awareness of the plight of the panda, but there is no evidence that this is the case.

Because of the short lead time in preparing for the arrival of pandas, graphics are frequently borrowed from other institutions. The graphics developed by the San Francisco Zoo have been purchased by a number of other institutions including Toledo. Busch Gardens (Tampa, FL) developed their own graphics but collected panda background information from earlier exhibitors.

Video programs are frequently a part of the exhibit area since visitors will spend a great deal of time standing in line. The Calgary Zoo produced an excellent video presentation on the plight of the pandas, based largely on a production from the Los Angeles Zoo. The Toledo Zoo incorporated two video presentation points, but neither was operating when the exhibit opened on 24 May.

Political Connections

"The competition (for panda loans) is so keen that cities often use their top political leaders to plead their case. Former Presidents Jimmy Carter helped the Zoo Atlanta get an early commitment from the Chinese, and Mayor Koch lobbied for the Bronx Zoo." (Boffey, 1988). In San Francisco, Mayor Dianne Feinstein opened negotiations for her zoo. Mayor Ralph Klein played a leading role in arranging the loan of pandas to the Calgary Zoo.

Some indirect connections are also used in negotiating panda loans, as in the case of the Toledo Zoo. Toledo identified a trade consultant, Robbie Lyle, in Hong Kong through a connection made with former Secretary of State Henry Kissinger. Kissinger had been hired as a consultant by a Fremont, Ohio businessman. Lyle served as the connection for Toledo's link with the CWCA.

Although the San Diego Zoo began its negotiations for pandas in 1979, it still used some political push to expedite the processing of the permit application through the Fish and Wildlife Service. Many prominent political figures in the Congress and Reagan administration have connections to southern California. The Toledo Zoo would later call on similar political connections to pressure the Service into approving their application.

In the case of Busch Gardens, a business entrepreneur, Ed Rolquin, from Florida made the arrangements for the zoo/amusement park. Rolquin is closely tied to major financial institutions on the PRC and operates a company called "Panda Enterprises". (Dumanoski, 1988)

Giant Pandas: Black & White in a Gray World, *Continued*

Loans Interfere with Breeding Efforts

Dr. George Schaller, the preeminent Western authority on the giant panda, spent five years studying pandas as WWF's principle researcher in China. Dr. Schaller has recently stated that "short-term exhibition loans of pandas are potentially detrimental to the survival of the species, unless the loans are of adults physiologically unable to breed." As Dr. Schaller explained "to disrupt the routine of the animals by shifting them repeatedly to different facilities, with different foods and climates, causes stress to the pandas and can disrupt future reproductive activity of both subadults and adults." Adults on loan may lose at least one reproductive season (the female at the Bronx Zoo came into heat while on temporary exhibition). Loans may curtail China's limited efforts in captive breeding (the pandas at the Toledo Zoo come from the Wolong Breeding Station).

Loans Threaten Wild Populations

Many pandas were taken into captivity during the recent bamboo die-off, and instead of being rehabilitated to the wilds as they should be, they have been retained in captivity. Sixty-four pandas had been "rescued" since October 1983 (China Daily 4/7/87). Free-living pandas are still being captured, and there is concern that the loan program provides an impetus for this unnecessary and serious threat to the wild population. Of the animals that have been out on loan to date, only two have been captive-bred; all the others were wild-caught.

Organizations Adopt Policies on Loans

These concerns--the increase in the number of loans, the alarming shipments of breeding age animals, and fears about the extent of poaching in China--have led the AAZPA, WWF, the IUCN and other groups to adopt special policies, the purpose of which has been to urge China to sharply reduce these loans, if not cease them altogether. AAZPA policy statements have imposed increasingly tighter controls on zoos seeking panda loans, culminating with mandatory guidelines adopted on 5 March, 1988, at the AAZPA board meeting in Monterey, CA. Since May, 1986, AAZPA has opposed any loan of breeding age animals.

On 10 February of this year, WWF announced its policy to oppose short-term loans, urging zoos and other institutions outside China to cease their involvement in exhibition loans of giant pandas. WWF has discussed its concerns with the Chinese scientists and authorities on many occasions. The WWF position was adopted by all 23 of the WWF national organizations.

In sum, the international conservation and zoological communities oppose short-term panda loans without proper regulation and administration. On balance, the threat these loans pose to the species as presently arranged far outweigh their potential benefits of public education and the generation of funds for Chinese and American institutions.

Background on The Toledo Panda Controversy

At present, the principle focus of the rent-a-panda controversy is the ongoing exhibit at the Toledo Zoo. In many respects, however, the history of the Toledo dispute illustrates how the financial and political momentum behind panda loans has compromised conservation goals and public policy, and hardened opposition from WWF, AAZPA, and other organizations.

Concerns about short-term loans in the U.S. conservation and zoo communities had become widespread by mid-1987. The professional staff of the Toledo Zoo, like most zoo professionals in the U.S., were fully aware of this growing opposition well before the zoo had made any arrangements with China. William Dennler, Toledo Zoo's director, had participated in AAZPA committee reviews of the San Diego and Bronx loans in 1987, both of which were negative. He expressed reservations about panda loans to the media, to AAZPA officials, to WWF staff, and to our understanding, to members of his own zoo's board of directors.

Giant Pandas: Black & White in a Gray World. *Continued*

Mr. Dennler, Toledo Zoological Society President Edwin Bergsmark, and a zoo attorney, Randall Teague, were told at a meeting at the WWF offices on 29 January, 1988, that WWF was moving toward formal policy in opposition to panda loans. By mid-February, well before Toledo Zoo signed its formal agreement with China (11 March, 1988) or submitted its application for an import permit (25 March), it was clear that any future loan requests would meet broad and strong objections from the zoo and conservation communities.

In early February, the 17th General Assembly of the IUCN, including Chinese representatives, approved a resolution critical of short-term panda loans; it urged China not to make further loan agreements until the impacts of the loans on the species had been investigated. Days later (15 & 16 February), a group representing concerned organizations met at the Brookfield Zoo to discuss concerns and potential guidelines to cope with the short-term loan problem. Attending were officials from AAZPA, WWF, IUCN, FWS and WCI-NYZS. A Chinese representative was invited but at the last minute was unable to attend. The meeting planners wished to limit the size of the meeting, and because it was deemed inappropriate to invite zoos with a vested interest in obtaining pandas, none of the dozen or so zoos then pursuing short-term panda loans were invited. Letters from directors Dennler (Toledo) and Maple (Zoo Atlanta) describing their panda loan proposals were received and shared with the participants at the meeting.

On 22 February, 1988, WWF publicly requested the FWS to halt all exhibition loans. On 4 March, FWS Director Frank Dunkle wrote AAZPA executive director Robert Wagner, informing him: "At the present time, there is not enough information available to determine whether any panda permit applications would meet the strict criteria of the Endangered Species Act and the Convention on International Trade in Endangered Species of Wild Fauna and Flora. The Service will not be able to take final action on any applications until there has been an opportunity to discuss further with counterparts in China the effects of such loans on wild or captive breeding populations, as well as how funds raised from the loans would be used to enhance the survival of the species."

Toledo signed its formal agreement with the Chinese on 11 March. The purpose of the loan was to help Toledo celebrate 150 years and set an arrival date of 15 May. The agreement detailed the financial obligation of Toledo, but made no reference to panda conservation or education. It also indicated that the Toledo Zoo had requested an extension of an additional 100 days.

At a meeting on 23 March with Toledo Zoo representatives, WWF staff expressed strong opposition to the loans in general and questioned Toledo's use of panda generated revenues to make capital improvements to the zoo. The Toledo Zoo contingent indicated that they would proceed with plans for the exhibit.

On 15 March, Toledo submitted their application to the Fish and Wildlife Service. In early April, China substituted two pandas of prime breeding age for the older pair that the zoo initially had requested and been promised. Toledo notified the Fish and Wildlife Service on 4 April about the panda switch. Panda switching has been common in a number of other panda loans. In Calgary just a few months earlier, faced with the crushing pressure of the Winter Olympics Games that were about to open, Peter Karsten, executive director of the Calgary Zoo had the courage and authority to tell China--and his own community--that he would not accept a similar last-minute substitution of breeding age pandas for the non-breeders he had agreed to exhibit. Conservation concerns came first, Karsten said, and he prevailed. By accepting breeding age animals, Toledo Zoo galvanized opposition to the loan. Calgary, like Toledo, had made a sizeable investment (approximately \$1 million CDN) in preparation for the panda exhibit.

All of the public comments the Fish and wildlife Service received on the Toledo Zoo application--from individual citizens and from such groups as AAZPA and the Humane Society of the United States--urged that the application not be approved. WWF considered the proposed exhibit primarily commercial, and therefore contrary to the Endangered Species Act and CITES. Based on the organization's experience with panda conservation

Giant Pandas: Black & White in a Gray World, *Continued*

in China, WWF stated that the exhibit was unlikely to enhance the survival of the species, and in fact posed an added threat. On substantive grounds, WWF was convinced that FWS would have turned down the application.

Sometime during the week of 2-6 May, Congressman Delbert Latta intervened on behalf of the Toledo Zoo with high officials at the Interior Department to gain expedited approval of the permit. At the close of business on Friday, 6 May, the permit was issued. The Toledo Blade opened a story on the permit with "Secretary of Interior Donald Hodel said yesterday the Fish and Wildlife Service might not have granted a panda importation permit for the Toledo Zoo except for the intervention of Rep. Delbert Latta (R., Bowling Green, OH)" (Toledo Blade 5/27/88)

The administrative record of the decision reveals that the review of the permit by FWS professionals was conducted largely after the permit was issued. None of the concerns raised by public comments or by FWS staff themselves at the Brookfield Zoo meeting (2/14-15/88) were addressed; none of the 'findings' required by law were completed prior to issuance, and crucial findings were never issued. None of the additional information Director Dunkle had requested from China on the impacts of the loans had been received.

On Monday, 9 May, WWF and AAZPA officials learned that the Toledo permit had been issued. In light of the overwhelming opposition to the loan, both organizations concluded that a failure to protest the FWS decision would send an unacceptable signal to other institutions seeking short-term panda loans: by developing an agreement with the Chinese officials, expending substantial amounts of funds preparing for the exhibit, and convincing a Member of Congress to intervene on an emergency basis, panda loans could be arranged rather easily. The court was the only arena left in which to oppose both the loan and the manner in which it was approved by the government. WWF and AAZPA felt they had to sue, and quickly; for it was learned that the pandas would be shipped from China on Friday, 13 May.

WWF and AAZPA filed suit as soon as papers could be drawn up and submitted to the court, which was Thursday, 12 May. It was the first time WWF had been the lead plaintiff in a suit against the U.S. government, and the first time AAZPA had been to court at all. Judge Norma Johnson did not grant the WWF/AAZPA request for a preliminary restraining order, which would have invalidated the import permit, making it unlawful for Toledo Zoo to import the pandas until a decision at a preliminary hearing was reached.

In the amended complaint, submitted on 24 May, WWF and AAZPA asked that the exhibit be closed and the animals returned to China as soon as it was safe for them to be shipped. The organizations requested tighter guidelines for future panda loans, consistent with U.S. law and the international convention (CITES), which would limit loans to adult animals no longer physiologically capable of reproduction.

Judge Johnson listened to oral arguments on 13 June in the District Court. On Friday, 17 June, Judge Johnson ruled in favor of the plaintiffs and ordered the Toledo Zoo to stop charging the extra fee for visitors to view the panda (\$2/adults, \$1/children). WWF posted a \$1,000 bond, in response to the judge's order, at noon on Saturday, 18 June.

On Monday, 20 June, in a related action, the Fish and Wildlife Service turned down the state of Michigan's application to import pandas for exhibit at the State Fairgrounds. The Service concluded that money from the Michigan loan would be used to create captive breeding facilities in China that would put pressures on pandas remaining in the wild. Michigan has appealed the FWS decision on their panda application. Subsequently the Service announced a moratorium on panda loan applications until stronger guidelines could be developed. This announcement was published along with a request for input to guidelines in the Federal Register on Friday, 24 June.

World Wildlife Fund's view, shared by many organizations and panda experts, is that the Fish and Wildlife Service should use its authority under the Endangered Species Act to adopt tough new guidelines that sharply restrict the number and type of loans. Clearly these

Giant Pandas: Black & White in a Gray World, *Continued*

loans should be kept to a bare minimum. And until new guidelines have been adopted, the Service should not approve further loans of giant pandas.

Other institutions have moved to support this position. The Minnesota Zoo (Apple Valley, MN) faced a situation in which state politicians saw pandas as a great opportunity to build support for the zoo and raise money. On 16 June, 1988, following presentations on the short-term loan situation, the zoo board unanimously passed a motion opposing the temporary exhibits:

Motion by E. Dayton, seconded by W. Rich, that the Minnesota Zoological Board express strong opposition to any temporary exhibition of giant pandas at the Minnesota Zoo until such time that a permanent breeding loan as part of an international captive breeding program for the species can be arranged.

China's New Policy

The news broke on 14 September, 1988 that China had adopted a new policy on Pandas, eliminating loans to the United States. At this point it is too difficult to assess the policy, but the new direction clearly indicates that the loans will be more carefully regulated by the Chinese.

Conclusion

The panda short-term loan conflict is a complex issue that deserves more than a casual appraisal. This issue, like so many other conservation challenges, demonstrates that there is no clear cut right or wrong answer. The issue is shadowed by dimensions that reflect international, national, state, local, conservation, financial, and political interests. In this world of gray, the only thing that remains black and white is the panda.

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Monitoring Perineal Swelling in Cercopithecine Monkeys

Ej

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Introduction

Many species of Cercopithecine monkeys, including baboons and macaques, display pronounced cyclical swelling and color change to the perineal region. Physiological studies on several species have found correlations between levels of swelling and reproductive processes. Wildt, et al. (1977) monitored hormone levels accompanied by vaginal cytologies throughout the reproductive cycles of several baboon species. They determined that the onset of swelling to the perineum coincides with hormonal changes associated with the estrus cycle. Shaikh, et al. (1982) determined further that ovulation coincides closely with the highest perineal swelling. They found that ovulation occurs toward the end of the maximum tumescence, with detumescence of the perineum occurring one to two days later. Optimal mating time is during this period of maximum tumescence (Hendrickx and Kraemer, 1969).

Careful monitoring of perineal swelling levels through simple observation can help determine several aspects of a specie's reproductive cycle. Knowledge of that cycle can allow the observer to detect inconsistencies or abnormalities in swelling patterns which may indicate changes to the reproductive process. The onset of puberty and menarche, as well as menopause or pregnancy, may result in changes in swelling patterns or in the occurrence of swelling at all.

In addition to physiological work, many behavioral studies have been conducted in relation to perineal swelling. The occurrence of menstruation or swelling to the perineum has significant effects on individual and group behavior. Michael and Herbert (1963), for example, found that the amount of male-female grooming activity in the rhesus (*Macaca mulata*) may depend on the endocrine status of the female. In addition, mounting activity increases as females enter mid-cycle. Rowell (1968) found similar results in baboons. Frequencies of grooming and sexual activity varied with levels of perineal swelling.

Agonistic behavior, especially intermale aggression, increases as females come into estrus. Dittus (1977) found that intermale fights or threats in the toque macaque (*Macaca sinica*) are most frequent or intense during the mating season when swelling occurs. Enomoto (1981) found similar results in the Japanese macaque (*Macaca fuscata*). Hausfater (1975) and Packer (1979) observed that intermale fighting among baboons produced more numerous and more serious wounds when they occurred for access to, or in the presence of, estrous females.

While providing useful information on a species' reproductive system, monitoring of perineal swelling levels may also help explain aberrant behaviors. The observer may detect intensified or increased aggression, grooming and sexual activity with increasing levels of swelling in the perineum.

Several theories exist concerning the evolution of perineal swelling and its adaptive significance. The "best male" hypothesis (Clutton-Brock and Harvey, 1976) argues that swellings function as a visual cue to initiate male competition for estrous females. The "best male" thus has the highest probability of fathering the females' offspring. A second theory, the "many male" hypothesis, argues that perineal swellings allow a female to attract and mate with several males, and this increases the possible paternal investment to her offspring (Hrdy, 1981). The final theory, the "obvious ovulation" hypothesis proposed by Hamilton (1984), argues that swellings help to provide males with paternity confidence by advertising ovulation.

Monitoring Perineal Swelling in Cercopithecine Monkeys, *Continued*

There has been considerable discussion and debate over the best explanation for the evolution of perineal swelling. However, researchers need not support one hypothesis or another in order to obtain useful information through observation of swelling levels. Physiological and behavioral studies have demonstrated direct correlations between levels of swelling and behavioral and reproductive processes. Thus, developing a system to monitor the perineal swelling levels of a particular species can be an invaluable tool to understanding the behavior and reproductive system of that animal.

Design

Many researchers have designed systems to monitor perineal swelling levels with a wide variety of methods and criteria. The number of swelling phases and their criteria are chosen arbitrarily to fit the needs of each particular study. Thus, monitoring systems for a single species can differ greatly and present some confusion. However, for general purposes it is advantageous to have a simple monitoring system that is consistent from study to study. It is doubly advantageous to have a single system which can be applied to several related species.

The first step in developing such a system is determining a standardized method for describing data. In this case, the data is the level or phase of swelling. At its simplest there are two phases of perineal swelling among Cercopithecine monkeys: presence and absence. The absence of swelling is simply termed the period of perineal rest. In the presence of swelling to the perineum, there are clearly divisions in levels and extent resulting in at least two additional phases of swelling. The observer can usually detect a point when swelling is at its height, or maximum tumescence. The phases immediately preceding and following maximum tumescence can be distinguished through daily observation and are termed perineal tumescence and detumescence, respectively. Thus, there is a continuum of four easily distinguished phases in the cycle of perineal swelling among Cercopithecine monkeys: perineal rest, tumescence, maximum tumescence, and detumescence.

Symbols have been assigned to each phase in the continuum to simplify data recording. Data points in symbol are then recorded on a basic calendar grid.

The four swelling phases, their representative symbols, and the data-recording grid can be used consistently for any species of Cercopithecine monkey with a single variant. Each species differs somewhat in the morphology of swelling to the perineum. Thus, the researcher must define the four phases of swelling as it applies to each individual species. This is done through simple observation of morphological characteristics coupled with research into previous anatomical descriptions. Once the phase descriptions have been established, daily monitoring is very simple and takes very little time.

The St. Louis Zoo currently maintains two species of Cercopithecine monkeys displaying cyclical perineal swelling, the hamadryas baboon (*Papio hamadryas*) and the lion-tailed macaque (*Macaca silenus*). An interest in better understanding the reproductive processes of these species has resulted in the system shown in Figures 1 and 2.

Discussion

Observations on behavior correlates

Although the primary focus of the current study is on the reproductive correlates to perineal swelling, several behavioral patterns appear to be influenced by the swellings' presence. While no frequency data was recorded for these behaviors, these patterns were evident through casual observation over the course of the study.

The overall focus of the groups' attention seemed to focus on those females at the period of maximum tumescence. The most obvious behavior surrounding these females was increased sexual activity. There was also a higher incidence of grooming and visual and

Perineal Swelling Levels --- Lion-tailed Macaque

Month: OCTOBER Year: 1987

ID	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
(080203)	0	(+)	(-)	(-)	(+)	+	+	+	(+)	+	(-)	-	-	-	-	+	+	(-)	-	-	-	-	0	0	0	0	0	0	0	0	0
(081202)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(081211)	+	+	+	+	+	+	+	+	+	+	●	●	●	●	●	●	●	●	●	-	-	-	-	0	0	0	0	0	0	0	+
(082223)	+	+	+	+	+	+	+	+	+	+	●	●	●	●	●	●	●	●	-	-	-	-	0	0	0	0	0	0	0	0	+
(084210)	0	0	0	0	0	0	0	0	0	0	0	0	+	+	+	+	+	-	-	-	-	0	0	0	0	0	0	0	0	+	
(076201)	0	0	0	0	0	0	0	0	0	0	0	+	+	+	+	+	+	+	+	-	-	-	-	0	0	0	0	0	0	0	
(082215)	0	0	0	0	0	0	0	0	0	+	+	+	●	●	●	●	●	●	-	-	-	-	-	0	0	0	0	0	0	0	0

(+) = Perineal Tumescence.

Divided into two swellings: subcaudal and bilateral ventral. The subcaudal swelling is a smooth spherical enlargement separated from the ventral swelling by a broad curved depression. The ventral swelling extends around the margin of each callosity. The callosities are depressed. The vulva is still easily visible within the ventral swelling.

(●) = Maximum Tumescence.

Subcaudal swelling is larger and elongated transversely. Its lateral extremities enlarge dorsally, partially surrounding the root of the tail, thus giving the swelling a reniform (kidney-shaped) outline. The ventral swelling has enlarged to obscure the vulva. The callosities are small depressed areas in the center of each lateral swelling. The callosities may change in color from a brownish tinge to pale. (Note: a third swelling may develop as a paired structure of triangular outline occupying the lateral angle between the subcaudal and ventral swellings.)

(-) = Perineal Detumescence.

Abrupt subsidence of all swellings. Vulva becomes visible.

(0) = Perineal Rest.

Skin around vulva develops a dusky tinge. Callosities become brownish in color.

Figure 2. Data grid for monitoring perineal swelling in the lion-tailed macaque.

Monitoring Perineal Swelling in Cercopithecine Monkeys, *Continued*

olfactory inspection of the perineal region, by males and females. Although these females received increased attention from their cagemates, they were often observed in a self-imposed isolation, removing themselves from the core of the social group. This may explain the heightened tension often seen by females at this time. It was the adult and subadult males, however, that exhibited the highest level of aggression during this period. The frequency of threats and displays increased as males increased their competition for estrous females.

Observations of physiological correlates

Daily monitoring of the swelling levels of individual animals and species established general patterns of overall reproductive cycles. These general patterns provide a basis from which inconsistent or abnormal patterns can be analyzed. As discussed previously, the occurrence of swelling to the perineum is closely associated with reproductive physiology. Thus, inconsistent cycling may indicate changes to the reproductive system. Close monitoring of swelling levels can provide important information for use in the management of those animals.

Hamadryas Baboon

The St. Louis Zoo's colony of 3.7 hamadryas baboons contains six mature cycling females and one aged adult male. Due to the age and physical condition of the dominant male, no breeding behavior has been observed for quite some time. Thus, no observations have been obtained on reproduction's effect on general cycling patterns. However, this study has provided useful data on the overall estrus cycle length for the species.

Cycle lengths have been computed from the onset of perineal tumescence from one cycle to the next. An average cycle length of 30 days has been obtained from the hamadryas baboon, with a range of 20-49 days. Table 1 shows cycle lengths and ranges for individual animals in the study.

Table 1

Estrus Cycle Length: Hamadryas Baboon

<u>ID#</u>	<u>Range (days)</u>	<u>Mean (days)</u>
F1	24-29	31.00
F2	27-33	31.30
F6	21-42	27.10
F7	26-33	29.90
F8	20-43	30.30
<u>F9</u>	<u>27-33</u>	<u>30.50</u>
total	20-49	30.00

Lion-tailed Macaque

The St. Louis Zoo maintains 5.11 lion-tailed macaques housed in two separate social groups. The colony has been very successful producing several offspring each year. This provides the observer with the unique opportunity to study the reproductive dynamics of several individuals from adolescents to mature females.

Monitoring Perineal Swelling in Cercopithecine Monkeys, Continued

In order to obtain accurate overall cycle lengths for the lion-tailed macaque, data was divided into three separate categories. Overall cycle lengths were computed from non-reproducing mature females, whose cycles were not influenced by the onset of puberty or pregnancy. Data was analyzed separately for the two remaining categories: reproducing mature females and adolescent females.

Non-reproducing mature females were represented by 2 of the 8 individuals in this study. An average overall cycle length of 30.26 days with a range of 24-38 days was obtained.

The cycles of the remaining 6 individuals were affected by puberty or pregnancy. Two young females displayed first swellings while the other four females produced offspring during the study or just previously. Upon resumption of cycling following the births of their offspring, mature females showed inconsistent cycling patterns and swelling levels. These findings paralleled those found in the cycling patterns and swelling levels of adolescent females. Both groups showed extremely wide ranges in cycle length. These results are summarized in Table 2.

Table 2

Estrus Cycle Length: Lion-tailed Macaque

	<u>Range (days)</u>	<u>Mean (days)</u>	<u>S.D.</u>
Non-reproducing Mature ♀ s	24-38	30.26	2.92
Reproducing Mature ♀ s	18-46	33.61	7.46
Adolescent ♀ s	6-42	22.81	9.43

Among adolescent females, the first signs of perineal swelling were very subtle and somewhat difficult to monitor. For the two individuals in the study, first swelling appeared at 33 to 34 months of age. Early swelling cycles were inconsistent in length, but the most interesting aspect was the physical character of the swelling itself. Swelling was very evident, yet clearly unlike the swellings of mature adult females. (See Figures 3 and 4). For the older individual in this category, indications of the first mature swelling did not occur until 10 months after the first swelling. The female was 44 months of age at that time. Whether adolescent females are ovulating concurrently with these early cycles cannot be determined in this study. However, it is possible that the early cycles of adolescent females are not influenced by the full complement of hormones associated with ovulation.

In the same way, reproducing mature females showed inconsistent cycle lengths upon resumption of perineal swelling. This post-partum latency period averaged 222 days for the four individuals in the study. Normal cycling patterns appeared on the average of 4 months later. Perhaps it is at this time that ovulation resumes also.

Applications to animal management

Changes in general cycling patterns associated with puberty and pregnancy are easily detected in this system. Thus, this has become an extremely valuable management tool. It is often necessary to remove offspring from their natal group in order to avoid inbreeding. However, it is sometimes difficult to decide when an animal must be separated prior to reaching sexual maturity. In species of Cercopithecine monkeys displaying cyclical perineal swelling, daily monitoring of individual females provides the necessary information.

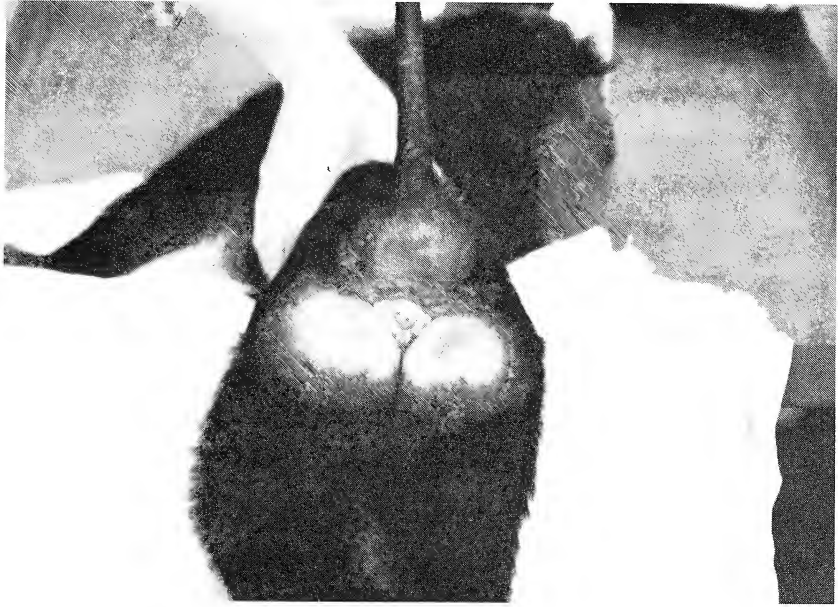


Figure 3. The typical perineal swelling of a mature female lion-tailed macaque.



Figure 4. The typical perineal swelling of an adolescent female lion-tailed macaque.

Monitoring Perineal Swelling in Cercopithecine Monkeys, *Continued*

Circumstances surrounding the pregnancies of certain individuals may also require management decisions. This monitoring system has been an extremely accurate indicator of pregnancy. It has also proven to be an accurate predictor of birth dates based on known gestations. Cycling patterns for the three lion-tailed macaques producing offspring during the study were extremely erratic and no general patterns could be established. Swelling levels often changes drastically from one day to the next (See Figure 5).

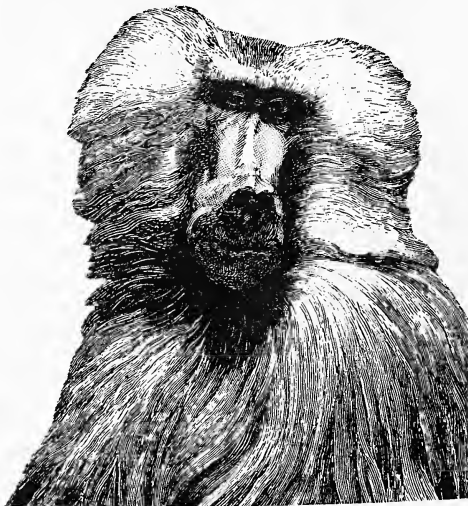
An irregular swelling pattern in a mature female was the first indication that a pregnancy may have occurred. Data from subsequent months coupled with physical signs such as distension of the abdomen were used as further indications. Based on a gestation of approximately 180 days, birth dates were computed from the height of maximum tumescence during the female's last regular cycle. It is at this time that conception is believed to have occurred. Actual birth dates have proven to be extremely close to those predicted.

Detecting pregnant and maturing females has been the most obvious application of a monitoring system such as this. However, this system has proven to be an invaluable tool in other aspects of the daily management of these animals.

Among the most important roles of individuals involved in the care and management of captive wildlife is knowing and understanding the animals. A monitoring system that requires daily attention has the advantage of producing greater familiarity with one's animals. The animal caretaker can easily identify each individual not only through physical characteristics, but through behavioral characteristics as well. This knowledge and familiarity allows the caretaker to more easily detect problems associated with social structure or injury or illness.

Conclusion

This system has become a very useful tool in better understanding the reproductive dynamics of certain Cercopithecine monkeys. It has also helped to explain abnormal or infrequent behaviors that are occasionally observed. These actions appear to be influenced by the presence of one or more estrous females. However, no direct correlations or conclusions can be drawn without further research. Future study incorporating the influence of perineal swelling on behavior will lead to a more complete understanding and appreciation of these animals.



Monitoring Perineal Swelling in Cercopithecine Monkeys, *Continued*

Perineal Swelling Levels --- Lion-tailed Macaque

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31			
Nov 87	+	+	+	+	+	+	+	+	+	+	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
Dec 87	○	○	○	○	○	○	○	○	○	○	○	○	○	+	+	+	○	○	○	+	+	+	+	○	○	○	○	○	○	○	○			
Jan 88	○	○	○	○	○	○	○	○	○	○	○	+	+	+	+	+	○	○	○	○	○	○	○	○	+	+	+	+	○	○	○			
Feb 88	○	○	○	○	○	○	○	○	○	○	○	○	○	○	+	+	+	+	+	+	+	+	+	+	○	○	○	○	○	○	○	○		
Mar 88	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	○		
Apr 88	○	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
May 88	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	○	○	
Jun 88	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Figure 5. Perineal swelling levels for lion-tailed macaque #082223 over several subsequent months. Note that there is no apparent cycling pattern after Nov 87. Based on this observation, a possible pregnancy was predicted as early as Dec 87. An infant was born May 6, 1988.

Monitoring Perineal Swelling in Cercopithecine Monkeys, *Continued*

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Captive Management and Propagation of the Reticulated Gila Monster (*Heloderma suspectum suspectum*) at the Arizona-Sonora Desert Museum

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Tucson, AZ

Introduction

The Arizona-Sonora Desert Museum (ASDM) is a natural history institution specializing in the interpretive display of living plants and animals and geologic components of the Sonoran Desert region. The location of the museum in the Arizona Upland subdivision of Sonoran desertscrub (Turner and Brown, 1982) provides a unique opportunity to experiment with more naturalized methods in managing captive colonies of native desert reptiles.

Gila monsters and beaded lizards of the family Helodermatidae have captured the interest of herpetologists and reptile fanciers for many decades. Their unique phylogenetic position, venomous characteristics and limited distribution have generated a worldwide demand for specimens. Both species are protected throughout their range in the U.S. and Mexico and are listed on Appendix II of the Convention on International Trade in Endangered Species (CITES). These mechanisms provide appropriate regulation of controllable human pressures to enhance the survival of these species.

Management and Conservation

Because of its location in the heart of the species' range, dozens of specimens of the reticulated Gila monster (*Heloderma s. suspectum*) are offered to the museum as public donations each year. As urban-suburban sprawl continues in Arizona, more individuals are ignorantly killed, collected or otherwise displaced. Automobile mortality is increasing as a limiting factor. We make a persistent effort to inform the public of the appropriate response to such encounters with a view to reducing the numbers of animals unnecessarily removed from the wild. Prospective public donors are apprised of State law protecting Gila monsters and are urged to release the animal where found or leave it alone. Those found in areas of high human density and automobile traffic or any which are in jeopardy of being killed are accepted. An annual report documenting all specimens received is made to the Arizona Game and Fish Department. This agency now largely limits *Heloderma* permits to specimens available through such "urban salvage."

Given local availability and the longevity documented in captivity (Bowler, 1977; Jennings, 1984), it might seem unusual that we are interested in propagating *Heloderma suspectum*. However several benefits are recognized. Propagation of such species produces juvenile specimens which serve specific interpretive and educational goals of the institution. For example, banded geckos (*Coleonyx variegatus*) are commonly misidentified as "baby" Gila monsters by the general public in Arizona. The comparative display of both species helps to dispel this misconception. Positive public interest in Gila monsters is stimulated by the media attention attracted by such reproductive events. Surplus progeny can help satisfy the legitimate demand for specimens. Finally, there is a continuing need to augment general knowledge of *Heloderma* biology, particularly pertaining to reproductive cycle and behavior.

Shaw (1964, 1968) published the first accounts of captive reproduction in *Heloderma suspectum* which occurred at the San Diego Zoo. Successful captive propagation of

Captive Management and Propagation of the Reticulated Gila Monster at the Arizona-Sonora Desert Museum. *Continued*

helodermatids has increased since 1974. Methods have been described in varying detail by Wagner et al. (1976), Beck (1980), Peterson (1982), Anstandig (1983) and Osborne (1984). These projects generally employed a term of cooling or artificial hibernation and manipulation of the photoperiod.

We will summarize the captive management and a propagation of *Heloderma s. suspectum* at ASDM.

Diet and Nutrition

Adults are fed one or more whole adult mice at an average of 10-day intervals. Mice are occasionally dipped in egg yolk if an individual refuses food more than 2-3 offerings, but eggs do not comprise a regular component of the diet. Jennings (1984) reported greater longevity in *Heloderma* fed mainly or exclusively on rodents or chicks as opposed to eggs. Adjustments are made in feeding frequency at the first sign of obesity. The goal is to sustain captive *H. suspectum* in the same condition as they were found in the wild based on comparative condition of the tail and pelvic region. An effort is made to sustain more relative weight in the females. One to two drops of the liquid vitamin Polyvisol® is placed on the fur of mice fed to males and females emerging from hibernation. This is discontinued after 4-6 weeks for males but is continued at two-week intervals throughout the active season for females. Females are fed mice injected with .5-1.0cc of an aqueous solution of calcium carbonate. Production of eggs with thin or calcium spotted shells led to this procedure in hopes of improving eggshell composition.

Disease and Parasites

Given the large numbers of *H. suspectum* handled at ASDM during the past six years, the incidence of serious disease and parasitism has been quite low.

Problems with ectoparasites in *H. suspectum* have been minimal. A few light brown mites similar to *Ophionyssus sp.* were found on one specimen but were quickly eliminated using standard Vapona treatment. A filarial worm *Macdonaldius sp.*, has been frequently found in the blood of wild *H. suspectum* from southern Arizona. One *H. suspectum* died from renal failure resulting from vascular obstruction by this organism. This is the only recorded mortality attributable to it at ASDM and we consider it to be relatively harmless.

Infections from *Pseudomonas aeruginosa* have occurred, accompanied by *Citrobacter freundii*. The latter is found in wild populations of *H. suspectum* and is not considered a primary pathogen (Jarchow, pers. comm.). These infections have been confined to freshly collected specimens and are probably the result of stress from maladaptation. Selection of antibiotics for treatment has been based on fecal culture and sensitivity. Two cases of intestinal trichomonads were diagnosed and successfully treated using Flagyl®.

Physical Environment

Heloderma suspectum accessioned to the ASDM collection are consigned to one of three categories: (a) display; (b) propagation/research and (c) lecture/interpretive use. Except for those used for educational purposes, specimens are housed in pairs. The three females are separated if they become gravid. Two pairs are housed separately off display. Each pair is maintained in a wooden floor cage H58 cm x W61 cm x L91.4 cm. The cage interior consists of coarse arroyo gravel at a depth of ca 10-20 cm. The lizards regularly dig and move gravel around the cage floor. This activity increases in females prior to oviposition. A wooden hide box H28 cm, x W25.4 cm x L35.5 cm is provided and is used extensively. Water is provided in 11.5 cm diameter pyrex dishes 5 cm deep. Specimens are not provided a regular soaking option in their enclosures although they are soaked ad libitum in

Captive Management and Propagation of the Reticulated Gila Monster at the Arizona-Sonora Desert Museum, Continued

separate buckets during the monsoon season from July-September. The entire cage is heavily sprayed each day rain occurs locally and the interior of the hide box is kept damp throughout this period.

A thermal gradient is provided with a 75-watt indoor incandescent reflector spotlight in a ceramic-base clip-on fixture attached to the rim of the cage. A rheostat enables fine adjustment of the temperature. The hot spot is set at 38-40° C from March-October. Full spectrum lighting is provided with a 20-watt Vita-lite® and a 20-watt BL blacklight mounted in a metal reflector spotlight fixture at ca 58 cm above the cage floor. The full spectrum fluorescent tubes are changed at 6-8 month intervals to maintain their optimal ultraviolet efficacy.

Circannual Regimen and Hibernation

All specimens are provided a photoperiod for 32.5° latitude according to Jones (1978). Length of photoperiod is controlled by electrical timers and adjusted at ca two-week intervals. This schedule provides a variation from ca 14:10 LD (summer) to 10:14 LD (winter) at which time reserve specimens are moved to the hibernaculum. Sexual pairs are hibernated together at 10-16 degrees C. (mean = 14° C). All lighting, including heat spots, is gradually reduced to total darkness by the end of November. Care is taken to minimize exposure to light during this period. A red gel covers room lights and a penlight is used to periodically examine the specimens. Drinking water and moist refugia are provided during hibernation to reduce body water loss (Lowe, pers. comm.). Ambient humidity is maintained at ca 72%. Specimens are weighed in and out of the three-moth dormancy period. Of seven specimens hibernated in 1985-86, four gained weight ranging from 3.1-10.9% of the IN weight ($x=2.4\%$). These data are probably attributable to water intake during hibernation and indicate the importance of water and/or sufficient humidity to reduce desiccation. Maintaining available water and high humidity during hibernation is especially important in drier climates or when mechanical refrigeration is employed.

Short basking/photoperiods of 2-4 hours commence in February. The specimens are removed from the hibernaculum in early March and natural photoperiods are resumed. The spotlight basking period is gradually increased to eight hours by mid-April.

Sexing

Sexing of adults has been based entirely on egg deposition, protrusion of hemipenes or identification of motile sperm during veterinary examinations. Probing has not been conclusive (Wagner et al., 1976) not have the criteria presented by Tinkham (1971) for sexing *H. suspectum* based on the shape of the preanal scales which are obscure in shape and not referable to Tinkham's criteria.

A series of *H. suspectum* and *H. horridum* were surgically laparoscoped at ASDM in 1982 with inconclusive results. Coelomic fat obscured the gonads in a number of the specimens.

We have noted apparently sex-related dimorphism in proportional head size and general body shape as discussed by Wagner et al. (1976). Known males generally have larger heads, wider at the temporals, and slimmer, straight-sided bodies than females. Known females seem to have smaller heads in proportion to s/v length and greater axillary-inguinal length in proportion to total length. No statistical analysis of these characteristics has been undertaken by us to date.

Reproduction

Successful hatching of *H. suspectum* occurred at ASDM in 1984 and 1986. These followed two years of experimentation with winter cycling, specimen manipulation and egg

Captive Management and Proprgation of the Reticulated Gila Monster at the Arizona-Sonora Desert Museum. *Continued*

incubation which failed to produce successful hatchings. The 1986 hatching was possibly the result of sperm retention from the wild and not a captive reproduction.

Virtually no reproductive behavior has been observed at ASDM. It is assumed that such behavior has occurred inside the hide boxes, after working hours or at night during May and June based on egg deposition dates. Staff observations of intraspecific behavior in *H. suspectum* have been limited to tongue-flicking.

Eggs and Incubation

Eggs from wild-gravid females laid prior to 1983 were almost always desiccated at the time they were found or were eaten by the lizards. Bogert and Del Campo (1956) and Shaw (1964) noted that *H. suspectum* will eat their eggs. Isolation and close observation of gravid females during June-July have prevented oophagy since 1983. Areas of dampened substrate are provided to reduce desiccation until the eggs are found. Eggs have usually been laid at night or after working hours. An exception was the 1986 clutch in which one egg was laid in a staff member's hand while on exhibit!

Eggs are incubated in vermiculite with varying proportions of water based on methods described by Tryon (1975). The recommended 1:1 ratio has proven inadequate to prevent rapid desiccation of the eggs in the arid relative humidity of southern Arizona. *H. suspectum* eggs have hatched best at ASDM in a ratio of 2:1 water:vermiculite at the beginning of incubation. Small amounts of water were added ad libitum to maintain condensation inside the incubation chamber; gallon glass jars covered with .002 ga. clear polyethylene film. The tops were removed several times weekly to allow gaseous exchange. The incubation temperature was maintained at ca 27-31° C (x=29° C). Relative humidity in the incubators is decreased after late September (end of summer monsoon season) allowing them to dry out to the point where no condensation was visible. It should be noted that the ambient humidity in southern Arizona varies from as little as 0-5% during the spring and early summer to 50-90% during the summer monsoon season (July-September). Therefore the procedures described here to provide a shift in incubation moisture levels are relative to our local humidity conditions and may not be appropriate in areas with high humidity ranges.

Six eggs were laid on 8-9 July 1984 by female 20011, accessioned on 14 April 1972. All appeared to be in excellent condition. Their disposition is indicated below in chronological order:

Egg #2 - 28 July - infertile; discarded

Egg #3 - 28 July fertile; embryo dead; cause not apparent. 21 days incubation.

Egg #4 - 8 October - split appeared on shell; egg cleaned and placed in sealed plastic bag containing physiological saline; fertile but dead. 92 days incubation.

Egg #1 - 9 October - 1 mm hole leaking fluid appeared on shell; hole sealed with drop of paraffin. 93 days incubation.

Egg #6 - 21 October - egg discolored; opened on 3 November; contained a fully-formed dead fetus. Cause not apparent. Incubation 105 days.

Egg #5 - 12 November - live neonate nearly emerged from egg at 0720 hours. Completely emerged by end of day. Incubation 128 days.

Egg # 1 - 12 November - live neonate had pipped egg; did not emerge until 14 November. incubation 128 days.

Captive Management and Propagation of the Reticulated Gila Monster at the Arizona-Sonora Desert Museum, Continued

The loss of the fertile egg may have been the result of too much contact moisture as evidenced by those which developed holes or splits in the shells while in a turgid condition. Nevertheless, a relative humidity of 60-80% seems to be necessary for successful hatching.

Both neonates had substantial yolk left at the time of pipping which was absorbed ca 24-30 hours later. At that time they emerged from the eggs. Complete absorption of the yolk seems to be extremely important to natal development. Therefore, for this reason we did not attempt to remove the hatchlings from their eggs.

Neonate Rearing and Development

Feeding the neonates was not begun until they had completely digested their yolk at ca 7-10 days. The first food offered was 10-14-day-old mice. This was increased to two per week as the neonates developed vigorous feeding responses. The diet was graduated to 21-day-old mice as the juveniles grew. Growth has been steady and no developmental anomalies have been detected.

Ontogenetic color and pattern change became evident six to eight weeks after hatching. The juveniles began to gradually change from the light cream ground color at hatching to pinkish tones. The banded pattern was noticeable at this time and the pattern has become more reticulated since.

Juvenile *H. suspectum* dehydrate rapidly under arid conditions. Care must be taken to maintain a relative humidity of ca 40-50% in their micro-climates. *H. suspectum* spend the majority of their time underground thus serving to reduce evaporative water loss. The juveniles appear to be more nocturnal than adults for perhaps the same reason (Lowe et al., 1986).

Conclusion

Huff (1985) reviewed the collective captive inventory for *Heloderma suspectum* as recorded by Slavens (1984). Forty-eight collections housed a total of 202 specimens. A total of seven neonates from two clutches were produced from these specimens. This indicates a need for continuing analysis of reproductive parameters in captivity as well as an increased commitment to captive propagation by those holding *H. suspectum* in their collections. This account is presented as supplemental information toward that end.

Acknowledgments

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Observations on Hoffmann's Two-toed Sloth (*Choloepus hoffmanni*) Parturition at the Burnet Park Zoo

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In 1983 the Burnet Park Zoo acquired a colony of Hoffmann's two-toed sloths (*Choloepus hoffmanni*). Since that time we have had 14 live births. Of these births four were observed, two were photographed and one was videotaped in its entirety. We believe this is the first video made of a Hoffmann's two-toed sloth birth.

The first two births were observed in 1985. In both cases the process was in a fairly progressed state when discovered. In the first case the entire head had been presented, although the dam appeared to be having a little difficulty delivering the rest of the body. A small amount of assistance was provided (primarily massaging the cloaca during contractions) after which the mother managed to naturally deliver the baby. The second observed birth was discovered a little earlier; only the nose was present. This female needed no assistance delivering her baby and the final stages of birth were photographed.

We had six more sloth babies born before the third observed birth in November 1987. This time the discovery was made even earlier; just before amniotic fluid began to be expelled. The birth was photographed with a 35mm camera, by a professional photographer, Lucinda Delvin, who was also fortunately a zoo volunteer. Nine days afterwards the fourth birth observation was made. As luck would have it, this birth was discovered almost at the onset of labor, which allowed time for the video equipment to be brought in and set up. Lucinda Devlin and her husband John Orentlicher brought equipment from Syracuse University and did the actual video taping.

The beginning of labor is characterized by cloacal licking. Abdominal contractions are not immediately visible, but licking occurs at regular intervals. Approximately 2 1/2 hours after seeing the onset of labor the first fluid discharge was noted. Fluid continued to be expelled with each succeeding contraction, but was usually consumed by the female while she was licking. The female licked her cloaca for the duration of each contraction without exception.

In all the observed births other females in the colony showed interest in the female and the emerging baby. Interaction by other females is tolerated and occurs sporadically throughout the process. In another observed birth as many as three additional females simultaneously licked the dam's cloaca during a contraction.

As labor continued contractions became more pronounced. It was possible to see the abdomen contract while the cloaca expanded. As is the case with most mammal births, the contractions began to increase in frequency and intensity, and resting time between contractions began to decrease.

Once the nose emerged the female's licking became concentrated on the baby's head. The membrane was cleared off the nose and the baby, although still in the birth canal, began breathing. The baby in this video slipped back into the birth canal many times after it began to breathe. The umbilicus, as usual, remained attached until long after birth, however, and the baby seemed unaffected by its continual descent back into its mother. In

Observations on Hoffmann's two-toed Sloth Parturition, *Continued*

all observed cases the baby's eyes open and vocalization occurs after the head is presented and prior to the emergence of the body. The baby can often be seen licking the mother as she is licking him.

After the nose emerged, the female began to use her claws more. She pulled at the cloaca, often hooking into it. This could be an effort to stretch the opening. As the final contractions began, the female grabbed the baby's head and pulled. The female adjusted her body so the cloaca was above the level of her head. In this position the baby tends to emerge onto the mother's abdomen instead of falling down between her hind legs.

As the baby is finally delivered, the female pauses briefly to smell the baby. Although sloths have a good sense of sight, they tend to orient themselves by smell. A typical sloth greeting begins by mutual smelling to identify each individual.

The newborn was well-secured to the mother after birth by the continual attachment of the umbilicus to the baby and the placenta. Flexible sheaths which cover the baby's claws during the birth are soon shed. Infants use their extremely sharp claws to cling to the dam's hair and skin. The mother spent approximately the next 45 minutes cleaning the remaining membrane off the baby. She was often joined by one or more female groupmates in this task. Although she manipulated the baby to clean it; she did not make a real effort to hold the baby next to her. We have had some cases of babies falling off their mothers although this has never happened to a healthy infant.

The placenta is usually delivered approximately one hour after the baby's birth. Prior to this the female makes no effort to sever the umbilicus. Instead she appears to use the umbilicus to help in the delivery of the placenta. In the birth previous to this one the female pulled on the umbilicus until the placenta began to emerge. At that point the dam and another female took the placenta in their teeth and pulled it from the birth canal. After the placenta was completely delivered, both females consumed the placenta.

As seen previously, interaction by other colony females is well-tolerated, perhaps even welcomed. This tolerance does not hold true for the adult male's presence. As soon as the approaching animal was identified as the male, the post-parturient female made it quite clear she would prefer him to go elsewhere.

In most births, observed and unobserved, the placenta has been consumed. In a few instances the placenta has fallen to the ground whole or partially consumed. Once the female had dropped it, she does not attempt to retrieve it (this is also true of babies that fall from their mothers). Consuming the placenta is no easy task. Placentas are very large and consist of lobular fleshy material. It is presumed that the placenta is consumed to help mask evidence of birth. Any nutritional benefits from this consumption are at this point unknown.

The sloth colony at the Burnet Park Zoo has yielded a wealth of valuable information. We are still trying to ascertain a definite gestation length as well as certain biological norms. We hope our continuing work with the sloths will help provide the answers to the questions that still remain.



Management and Behavior of Western Tufted Deer (*Elaphodus cephalophus cephalophus*) at the San Diego Zoo

By

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Abstract

The tufted deer in the San Diego collection arrived as a result of an animal exchange program with a sister zoo in Sichuan, China. A trio of 2.1 tufted deer were first sent to Tierpark Berlin, German Democratic Republic, for a six-month quarantine. When the trio was ready to move to a second quarantine in Hamburg, West Germany, the female remained in Tierpark because she was nearly ready to give birth to a fawn. The males successfully passed quarantine in Hamburg and New York and were placed in their final quarantine at the San Diego Zoo hospital upon their arrival on 31 December 1985; and then were placed on exhibit in early 1986 on Hoof and Horn Mesa. The female left behind in Tierpark unfortunately did not pass quarantine but her healthy fawn, a female, arrived in San Diego on 28 July 1986.

The San Diego Zoo is the only zoo to exhibit tufted deer in the Western Hemisphere and must follow the guidelines of federally imposed Permanent Post Entry Quarantine (P.P.E.Q.). With P.P.E.Q., the deer from China must always remain in San Diego under permanent quarantine, but their offspring may be sent to other institutions.

The arrival of a new species was a challenge for keepers because information on tufted deer is nearly nonexistent. Since tufted deer are so closely related to muntjacs, the same management used on muntjacs was initially utilized. The tufted deer were observed for 23 hours and periodic documentation of their behavior was submitted to curators, animal care managers, and keepers (observation methods used were Focal Animal and All Occurrence).

Introduction

Elaphodus cephalophus cephalophus, western tufted deer, share with *muntiacus*, muntjacs, is the subfamily muntiacinae, the distinction of being the most primitive antlered deer. Tufted deer and muntjacs first appeared in the Miocene with more advanced deer evolving from Pliocene ancestors which can be traced back to early Miocene muntjac-like deer (Dolan, 1971). Muntjacs have bony ridges along the frontal bones which help support the pedicled antlers; tufted deer possess tiny pedicled antlers nearly hidden by the thick forehead tuft. Tufted deer lack obvious frontal ridges found in muntjacs, but both tufted deer and muntjacs possess upper canines derived into tusks with muntjac tusks more turned out at the tips. Only males in muntiacinae possess antlers and tusks (Allen, 1938).

According to Dolan (1986) there are three recognized species of tufted deer: Hubei tufted deer (*Elaphodus cephalophus ichangensis*), Michie's or eastern tufted deer (*Elaphodus cephalophus michianus*), and western tufted deer. The Hubei tufted deer are from Hubei and eastern Sichuan with Michie's tufted deer from Zhejiang, Fujian, and northern Guandong provinces (Dolan, 1986). In the early 1900's tufted deer were rare in captivity and as museum specimens, resulting in very few specimens available for evaluation of different species (Allen, 1938). It is possible that only the eastern and western forms may be recognized in the future (Dolan, 1986). Western tufted deer are the largest of the species and are found from "central Sichuan through Yunnan to northern Burma." (Dolan, 1986.) The status of tufted deer is assumed to be secure but unfortunately there have not been population studies to confirm their true status.

Management and Behavior of Western Tufted Deer at the San Diego Zoo. *Continued*

Western tufted deer possess the darkest color range of almost black to a chocolate-brown, the summer pelage more rufous, with the head pale-ticked. The muzzle, inguinal regional, and under portion of the tail is white and the outer tips, outer basal hair tufts and the inside of the ears are marked with white also (Allen, 1938).

Walker (1975) best describes tufted deer as "dainty deer...somewhat larger than muntjacs," probably ascribing the daintiness to the tufted deer's more refined head and body form in comparison to muntjacs.

Enclosure

The tufted deer exhibit on Hoof and Horn Mesa (Table I) is enclosed with gunnite walls varying in height from approximately 6' to 7 1/2'. The visitor viewing side of the wall is approximately 5' 8" high with eight strands of tightly strung wire (10-12 gauge) for a height of 8' 8". The wire strung across the shorter wall is an effective barrier for tufted deer and does not interfere with viewing. The tufted deer have access to the concrete-floored barn (approx. 12' x 9') which has straw bedding and heating in the winter. During the winter the barn door is opened just enough for the deer to get through and a carpet strip which reaches from the top of the door opening to slightly above their heads keeps out drafts. The exhibit is planted with grass and two acacia trees which are protected with welded wire fencing. The entire enclosure is approximately 65" x 50'.

The holding pen for the bachelor male (M1) is approximately 21' x 24' and is enclosed with gunnite walls of the same height range as the exhibit. A small section of the holding area is planted with grass and the remainder is covered with decomposed granite. The concrete barn is approximately 14' x 11' and a bedding of pine shavings is provided year-round.

TABLE I

TUFTED DEER IDENTIFICATION

<u>ID.</u>	<u>STATUS</u>	<u>COMMENTS</u>
Dominant Male (M1)	Off-exhibit holding area	Cage mate with M2 at Hoof and Horn Mesa (HHM) from 1/86 to 8/86
Submissive Male (M2)	On exhibit at HHM	Cagemates: F1, F2
Female (F1)	On exhibit at HHM	Cagemates: M2, F2 Introduced to M2 8/29/86
Female (F2)	On exhibit at HHM	Cagemates: M2, F1 Born 6.8.87

Management and Behavior of Western Tufted Deer at the San Diego Zoo. *Continued*

Feeding

The tufted deer have free access to alfalfa hay and receive the following in shallow plastic buckets: 1/4" herbivore pellets, horse sweet feed (14% protein), omnivore biscuits, carrots, yams, apples, kale, and Romaine lettuce. Occasionally keepers are able to provide acacia browse as a supplement to their diet.

In April 1987 one of the males (M1) was observed eating garden snails off the walls of his enclosure. Because data in captive management of tufted deer is nearly nonexistent, keepers decided to experiment with different foods and found omnivore biscuits to be highly preferred. Although the eating of snails does not prove the diet to be insufficient, a wide variety of foods is beneficial to these deer because of food habits of small forest ruminants. The diminutive size of a small forest ruminant combined with a high metabolic rate requires optimal food ingestion; rumen function may not be sufficient for speedy ingestion so small forest ruminants need foods containing high protein and low fiber (Barrette, 1987).

Sri Lankan muntjac (*Muntiacus muntjac*) and Reeve's muntjac (*Muntiacus reevesi*) eat fruits, buds, and fresh leaves (Barrette, 1987), behaving not like grazers or browsers, but "nibblers", which search for food on the forest floor in the form of fallen fruits and buds, and seek other vegetative matter they can reach (Barrette, 1987). Tufted deer have been observed standing up on their hind legs to reach leaves above their heads.

Medical

Fortunately, the San Diego Zoo has not had to immobilize the tufted deer, but if it were required the same procedures for muntjac and other small deer would most likely be used. On 2/17/87 the female (F1) was sedated with M-99 so an abscess on her cheek could be lanced and there were no complications during this process.

Communication

--Vocalization

Tufted deer use vocalizations in the form of a bark which occurs during courtship or alarm (Walker, 1974), "whining" and "clicking". The whining is a high-pitched noise emitted during periods of stress such as unwanted pursuit by a dominant individual or confrontations between a dominant individual and a submissive individual. Whining vocalizations are emitted by submissive individuals and are frequently accompanied by "sneering" (see Figure IIIA). Sneering involves the pulling back of the upper lips to expose the canines and ranges from slight to moderate to a full display of the canines. The level of excitement or fear seems to determine the intensity of the whine/sneer. Clicking is produced with the mouth closed and has occurred during a variety of situations, such as normal interactions, investigation of a new area, and while walking past other individuals in an enclosure. Sometimes the clicker is emitted for no apparent reason to the observer when the individual is alone or with another tufted deer or group. The excitement level involved, rather than the situation occurring, is probably the reason for different levels of vocalizations (Walther, 1984) such as whines, sneer/whines and frequency of clickers in a given time period. This unusual form of communication probably reflects the comfort level of the individual and could be helpful in determining the compatibility of cage mates.

--Pelage

Visual communication involves the raising of the pelage from the base of the neck to the tail, raising the forehead tuft, flagging with the tail, "tail flopping", and "tail flaring" (See Figure IIIB). Pelage on the forehead and the body can be raised stiffly and independently during periods of excitement or fright. The tail flags (much like other

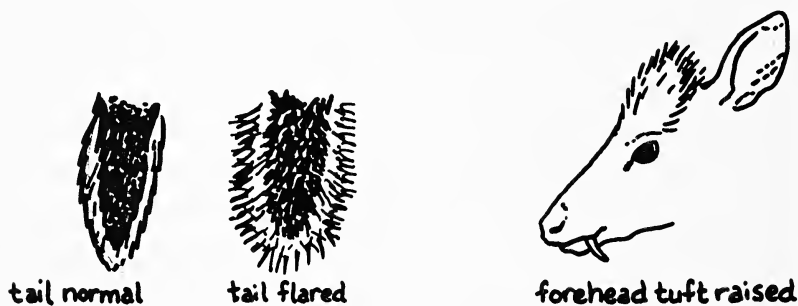
Management and Behavior of Western Tufted Deer at the San Diego Zoo. *Continued*

species of deer) when the tufted deer are bounding or running. Tail flopping appears to be a daily maintenance activity where the tufted deer simply flops their tails up and down at approximately every five to ten minutes. In tail flaring the tail is up or down with the hair flared out stiffly. Tail flaring seems to occur during periods of excitement or mild fright where the individual does not flee. (See Figure II)

Figure IIIA



Figure II

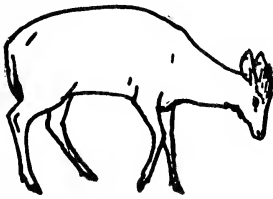


--Posture

The two males exhibited together on Hoof and Horn Mesa were observed to communicate dominant and submissive postures. Dominance was determined in one male (M1) because of certain threat behaviors directed toward the other male (M2), such as chasing and butting with the antlers or forehead. The other male (M2) reacted to the threats with sneers or sneer/whines and would crouch, crawl (move away in a crouched position), or lie down with the head and neck stretched forward on the ground. To lie down in this fashion is described as "lying down in full submission" by Walther (1984) and is considered to be the most extreme form of submission (See Figure IIIB). In eleven hours of observations, clicker vocalizations were performed by both deer, yet sneers and sneer/whines were only present in the submissive male (See Table IV).

Management and Behavior of Western Tufted Deer at the San Diego Zoo. *Continued*

Figure IIIB



crouch



crawl



lying down-submission

TABLE IV

COMMUNICATION AND VOCALIZATION BY PERCENT

<u>MALE I.D.</u>	<u>CLICKER</u>	<u>SNEER</u>	<u>SNEER/WHINE</u>
M1	100%	0%	0%
M2	71%	18%	11%
TOTAL	76%	15%	9%

Reproduction

The gestation of tufted deer is approximately 180 days (Walker, 1975) and when a fawn is born it is the same coloration of the parents, but has a row of spots along the midline of the back. There is not any information available on the courtship of tufted deer, but during observations of the male (M2) to female (F1) introductions, the male repeatedly clickered when trying to sniff the rump of the female. When the male was able to reach the rump of the retreating female, he would stop and perform flehmen. Tufted deer probably exhibit courting behavior found in other small forest deer (i.e, tongue licking, rump sniffing, etc. described by MacNamara and Eldridge, 1987), but their clicker vocalization may be a unique part of courtship.

Management and Behavior of Western Tufted Deer at the San Diego Zoo. *Continued*

On 6/8/87 the female tufted deer (F1) gave birth to a healthy female fawn (F2) and they were left in the exhibit with the male (M2) without a problem. The offspring (F2) currently remains with the parents on exhibit. On 3/21/88 a full-term stillborn fawn was found in the tufted deer exhibit; this fawn was from the same dam (F1) of the fawn born on 8/6/87. A necropsy found the cause of death to be fetal hypoxia due to a probable fetal distress caused by placenta previa (premature placental separation).

Postpartum estrus is not common in most mammals because involution of the uterus takes up to several weeks after parturition. Malayan chevrotains (*Tragulus napu*), in the family Tragulidae, are known for a postpartum estrus of one to three days after parturition (Fraser, 1968), and two muntjac species, Reeve's and Sri Lankan, have a postpartum estrus with mating one to five days after parturition (Barrette, 1977-a). With only two births in the San Diego collection, it is not possible to tell if postpartum estrus occurs in tufted deer, but the possibility should not be ruled out.



Female Western Tufted Deer (*Elephodus cephalophus cephalophus*) and fawn at the San Diego Zoo. (Photo by Craig W. Racicot; ©Zoological Society of San Diego 1987)

Maintenance Behavior

- Scent Marking

There are only three scent glands known to be present in tufted deer: antorbital, metatarsal, and interdigital on the hind feet (Muller-Schwarze, 1987), yet the tufted deer have been observed rubbing their foreheads in a continuous up and down motion (accompanied by back and forth rubbing of the mouth and nose) on bark and vegetation. This has been observed in both males using an up and down motion of the forehead followed immediately by vigorous rubbing of the mouth on browse branches and plywood walls. Forehead rubbing has been observed on 4/5, 5/31, 8/26, and 8/29/86, the latter performed for eight minutes continuously in the presence of another male. Muntjacs possess both frontal and facial glands (Muller-Schwarze, 1987), but it is not known if the closely related deer have similar glands located in the forehead area. Forehead rubbing has also been observed in Pudu (*Pudu pudu*) and Red brocket deer (*Manzama americana*) (MacNamara and Eldridge, 1987).

Management and Behavior of Western Tufted Deer at the San Diego Zoo. *Continued*

Antorbital marking occurs frequently while the deer are moving around in their enclosures. The antorbital gland is well-developed and can be everted for precise marking of twigs, grass, and other objects. Both males and females scent mark their enclosures with the antorbital glands, and grass and twigs are occasionally licked before antorbital marking. The antorbital marking employed by tufted deer is probably a way to let other deer know they are in the area since their habitat is densely forested and visual contact is very limited.

Scraping the ground with the front feet is an interesting behavior performed by both sexes, usually occurring after a combination of antorbital marking, urination, and defecation. Scraping with the front feet usually occurs with object aggression in other deer species (Walther, 1984).

Tufted deer maintain several dung piles in their enclosures and deer exhibited together will habitually leave a deposit on top of feces left by another tufted deer. Localized dung piles are found in the following small deer: Water deer (*Moschus*), muntjacs, brocket deer (Muller-Schwarze, 1987), and pudu (MacNamara and Eldridge, 1987). The communicative value of dung piles in the tufted deer and other small deer is not known at this time but is considered to be a form of scent marking in pudu, red brocket (MacNamara and Eldridge, 1987) and Reeve's muntjac (Barrette, 1977-b).

-Grooming and Resting

When at rest, tufted deer prefer to lay in a semi-curved position with the feet tucked up close to or under the body or the legs will be stretched out straight for a very short time. Cud chewing occurs most often during rest and the longest period of cud chewing recorded during observations was for thirty minutes.

Grooming appears to be a very important activity in tufted deer. They groom any area they can reach, including genitals, the tail, and between the hooves. Antorbital glands are easily reached with the long tongue and are often cleaned after frequent scent marking. Tufted deer are such fastidious groomers that sessions of cud chewing are often interrupted to carefully lick a hair into place. Males were very rarely seen grooming each other, and when this occurred the grooming was immediately followed by an antagonistic nip with the teeth. Allogrooming does occur in female to female situations and female to male, but more observations are needed to interpret different types of grooming activity.

-Locomotion

Tufted deer have typical cervid locomotor patterns and also will walk very lightly with the front feet brought up high and well forward in each carefully placed, dainty step with the hind feet brought up forward as well and almost overstepping the front hooves. This walk leads to difficulty when the tufted deer try to negotiate the sloping cement leading to the barn--with the hind feet reaching so far forward, they sometimes slide back on the cement, which scrapes the bottom of the hooves. Keepers maintain a layer of decomposed granite or sand on the slope, giving the deer better traction. When the deer are slightly startled or hear an unfamiliar noise, the first reaction is to freeze in place, even with a foot in midair, and if spooked they will bound or run to their barn or shelter.

Conclusion

Experience with muntjac has been helpful in captive management of tufted deer, but the flexibility of keepers and management (like adding new food to the diet) has allowed the best care possible for these enigmatic deer. The San Diego Zoo is the only zoo in the

Management and Behavior of Western Tufted Deer at the San Diego Zoo. *Continued*

Western Hemisphere known to exhibit and breed tufted deer. With observations and careful management San Diego hopes to enjoy successful tufted deer births which can be developed into satellite populations in the future.

Acknowledgments

I would like to thank the following people who contributed their time, talents, ideas, and support to help make this work possible:

Mammal Curator Carmine Penny; Animal Care Manager Dick Sweeney; Zoo Lead Keepers; Zoo Photographer and Technician Craig Racicot, and the entire Photo Lab Staff; Keeper John Michel; fellow Loan Keepers Theresa Macias, Kathy Duke, and Steve Cunningham; Zoo Library Staff; and especially Senior Keeper Art Goodrich for his support and patient tolerance during my suggestions, direction, and agonizing while he photographed the tufted deer.

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Nestbuilding Behavior of the Ruffed Lemur: A Longitudinal Study at Miami Metrozoo

By
Rachel Rogers, Primate Keeper
Metrozoo, Miami, FL

A quote from Lee S. Crandall:

"More and more, as the work progressed, I became impressed with the futility of attempting to present a total picture. No book of this nature can ever be final, for the zoological garden is a fluid, moving entity, changing so constantly in concept and execution that any statement of existing conditions may be quickly outmoded. But at least the past is unchangeable, and much that I have missed will be made known by future researchers."

Natural History/Lemur Fauna Evolution

Fossils of ancestral lemur fauna have been found in Eocene sediment on the continents of North America, Europe and Asia. This fact distinguishes lemur forms as being the only primate to have ever inhabited the continent of North America in prehistoric times. The fossil prosimian forms represented (Philip D. Gingerich, 1975) are *Pelycodus*, *Notharctus*, and *Smilodectes*. Although it is widely believed that ancestral forms of lemurs originated in Africa, there is new geophysical evidence that it is unlikely to have occurred the way previously theorized.

Nearly 80 years ago, Alfred Wegener proposed the theory of continental drift. In the past 30 years, the study of motion and its effect on the continents has developed into a field of paleogeography called plate tectonics. The movement of continents has actually been measured and combined with data collected by radioactive-isotope dating. This has caused many theories on the evolution of primates to change (Sherwood L. Washburn, 1978).

Recent reconstruction of the paleogeography of the Indian Ocean in the early Oligocene (McKenzie and Sclater, 1971), suggests that India and Ceylon were below the equator in the early Oligocene, but by the end of the Oligocene, they had moved into the northern hemisphere. During this time, there was presumably a very strong subtropical rotation occurring in the Indian Ocean, together with a strong southeast trade wind, which could have caused a certain amount of vegetational exchange, floating small animals from India to Madagascar (Gingerich, 1975). It is believed that this is when ancestral lemur fauna were introduced to Madagascar. Simons (1972) indicates that there is an absence of lemur forms in the diverse primate fossil remains of the Oligocene and Miocene of Africa, further strengthening this claim by Gingerich.

All these theories are more plausible than the older ones due to the newest paleographic reconstructions, but further fossil finds are necessary to confirm them. The subfossil lemurine forms known as *Varecia insignis* and *V. jullyi*, precursors of the ruffed lemur (*V. variegata*), are considered to be very similar (Tattersall, 1973) and Tattersall classifies them under *Varecia insignis*. Walker (1967) refers to *V. insignis* as a modern form, due to the extinction of this species caused by man some 1,500-2,000 years ago.

Natural History - Habitat

The habitat of the ruffed lemur (*Varecia variegata*) is the densest tropical rain forest in the world, with consideration of the number of trees per hectare (Pollock, 1986). The island they inhabit is Madagascar, the fourth largest island in the world, with a land mass of

Nestbuilding Behavior in Ruffed Lemurs at Metrozoo, Continued

590,000 km. (230,000 square miles). The lush, green vegetation indicative of the eastern coastal strip is represented by a diverse collection of plant species. There are a number of tropical trees species represented; epiphytes, moss, and lichen are found on the east coast.

There is no clear dry season, leaving the eastern strip hot and humid, much like our Miami area climate. The mean summer highs are in the 28.67° C (80° F) range, while the mean winter low is in the 15.56° C (60° F) range. In comparison, the Miami maximum daily temperature is 28.1° C (82.6° F) and the minimum daily temperature is 20.38° C (68.7° F), (Palmer, 1987).

Wild ruffed lemurs spend a great deal of their time above the ground in the layered forest canopy. Due to their habitats, they are as difficult to study as the orangutan (*Pongo pygmaeus*). There is a great void of knowledge concerning the daily activity patterns, reproductive behavior (e.g., nest building) and the diets of wild ruffed lemurs.

Although infants have been seen in the crotch of trees or parked arboreally in naturally occurring epiphytic plants (Jean Jacques Petter, 1965), no ruffed lemur nests have been observed while being constructed by females in the wild (Pereira, Kepler, Simons, 1987). In a study conducted by J.J. Petter in 1965 near Tananarive, Madagascar, semi-free ranging wild female black and white ruffed lemurs (*Varecia variegata variegata*) were first observed to make nests in a nestbox several days or weeks prior to parturition.

Petter could not substantiate the existence of nests high up in the trees and wild-caught ruffed lemurs at the Duke facility were not observed to weave or tangle nest materials, making arboreal nest building an improbable proposition. Therefore, ground nesting in ruffed lemurs and bi-parental guarding of offspring are highly probable in the wild.

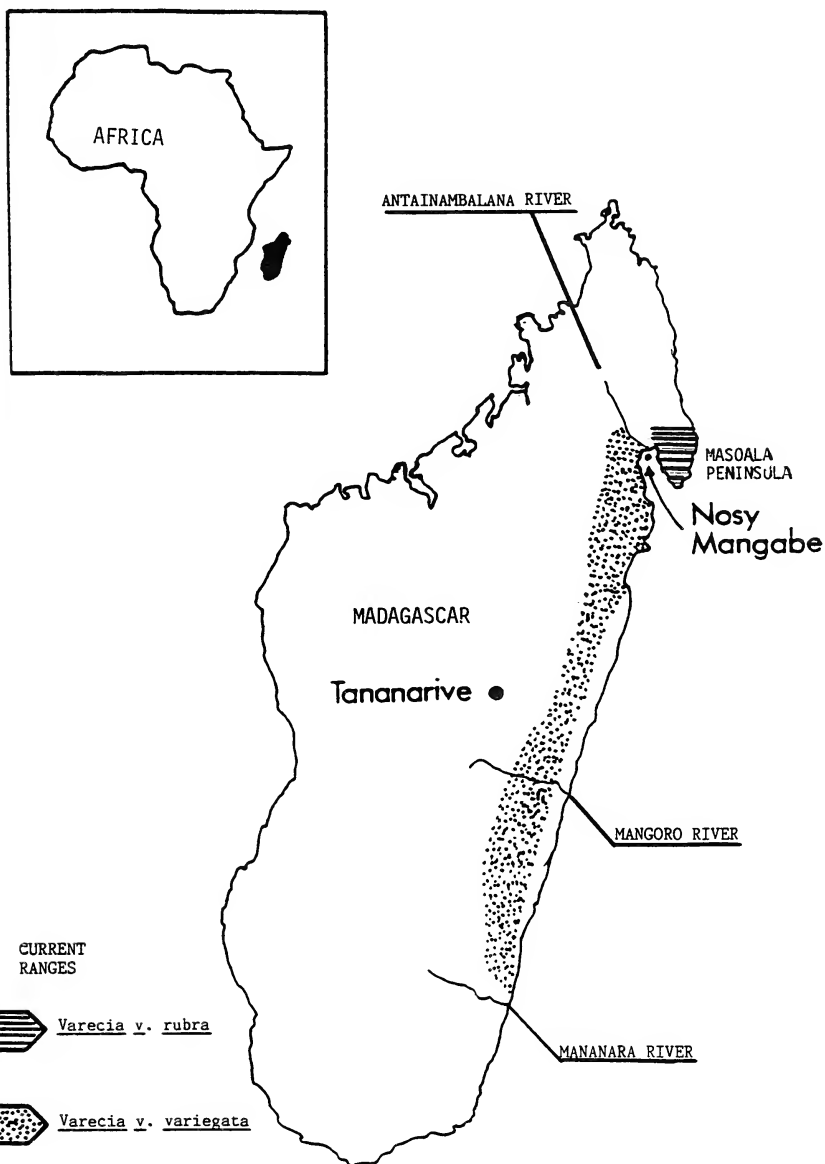
Dr. M.E. Pereira of the Duke Primate center, in Durham, NC, sought in 1985 to investigate the possibility that ruffed lemurs construct nests on the ground. This work was published by Pereira, et al., 1987. I feel the implications of Pereira's theories will answer many questions zookeepers have about ruffed lemur reproductive behavior.

Range

The red ruffed lemur's (*Varecia variegata rubra*) natural range is restricted to the Masoala Peninsula on the northeast coast of Madagascar. Dividing the western most part of their range from the black and white ruffed (*Varecia v. variegata*) is the Antainambalana River. A narrow strip of rain forest on the east coast running southward to the Mananara River is the natural range of the black and white form (see Figure 1).

Man has introduced the black and white form to an island called Nosy Mangabe, located 6 km south of Maroantsetra in the bay of Antongil (15 29' S, 49 45' E.), (Constable, et al., 1985) (J.J. Petter, pers. comm.). The island has been an important conservation area since December, 1966, when it was declared to be a Special Preserve. Releases have been funded by the Madagascar Department of Water and Forest, the Museum of Natural History in Paris, and International Union for the Conservation of Nature (IUCN), to be funded by the World Wildlife Fund (WWF).

A combination of depleting range due to deforestation and hunting is the cause of the diminishing numbers of ruffed lemurs in the wild. Some hunting is suspected on Nosy Mangabe, but has not been substantiated. On the coast where there is food, noose traps are used to hunt the ruffed lemur, as well as shooting them with guns. Ruffed lemurs are a source of meat to natives in a land where there are few species of large mammals to hunt.



Adapted from Tattersall(1982),Constable et al(1985)

FIGURE 1.

Nestbuilding Behavior in Ruffed Lemurs at Metrozoo, Continued

Nesting Behavior at Metrozoo

Nest Building (cage versus island)

Due to the enriched environment of the ruffed lemur island at Metrozoo, keepers have identified patterns of nesting behavior. These patterns were not evident in our off-exhibit caged ruffed lemurs.

We have observed nesting behavior by the female to occur during the male's testicular cycle and during the month birth is predicted to occur. The most intense nesting behavior on the island and in the cage enclosures occurs an average of 3-4 days prior to parturition (See Figures #2 and #3).

In the caged ruffed lemurs, more "tail manipulation" was observed than in the female on the island. Tail manipulation as reported by the San Diego Zoo (Brockman et al., 1987) is an action where the females will carry their tail in their mouth and is associated with frequent entering and exiting of the nestbox. The occurrences of this behavior starts about one week prior to birth.

At Metrozoo, it has been observed that females will engage in tail manipulation at about the same time as in San Diego, one week prior to birth. The manipulation of the tail is a bit different by our experience, in that the tail is manually encircled in front and around the female and curled or rubbed across the back. At times, a low volume squeak or moan is uttered by the female in conjunction with this behavior. When the caged females are provided with branches, the same pattern is repeated, but the female uses the branch instead of her tail. The female on the island has been seen doing the same action with her tail or branches at each nest site days before birth. The caged females engage in tail manipulation inside and outside of their nestboxes.

The occurrences of tail manipulation is clearly associated with nesting behavior, as this behavioral pattern is not presented at any other time of the year at Metrozoo.

Parking (Cage versus Island)

Parking in ruffed lemurs is a behavior associated with post-partum maternal behavior where infants are deposited high in the trees (Pereira, et al., 1987). The ruffed lemurs observed during Pereira's study were in an area of about 3.6 hectares (9 acres) and J.J. Petter (1965) observed wild ruffed lemurs in a natural habitat. The size differences between the aforementioned studies and average spatial dimensions in captivity are very different, as well as the lack of terrestrial predators in a captive situation. With these two factors in mind, I feel it is safe to say that the average zoological facility could experience this behavior to be a terrestrial activity and/or an arboreal activity.

In observations of seven litters (Table 4) of mother-reared young at Metrozoo, there were two main differences in parking behavior than previously documented (Rogers, 1987). In observations of caged red ruffed lemurs, mothers parked their young on the floor and atop nestboxes or shelves. In our black and white ruffed lemur female, "true" parking was observed where infants were placed on branches of live trees or cement artificial trees above the ground. When island infants were placed on the ground, it was associated with moderate cover; therefore, this could not be considered true parking.

In reports by six out of ten zoos surveyed in Great Britain (Blackwell, 1985) and in Germany (Hick, 1984), parking was associated with the floor, atop nestboxes or shelves, similar to our caged ruffed lemurs. At the London Zoo, there is even a female tricolored ruffed lemur that parks her young starting one day after birth as reported in Blackwell's survey.

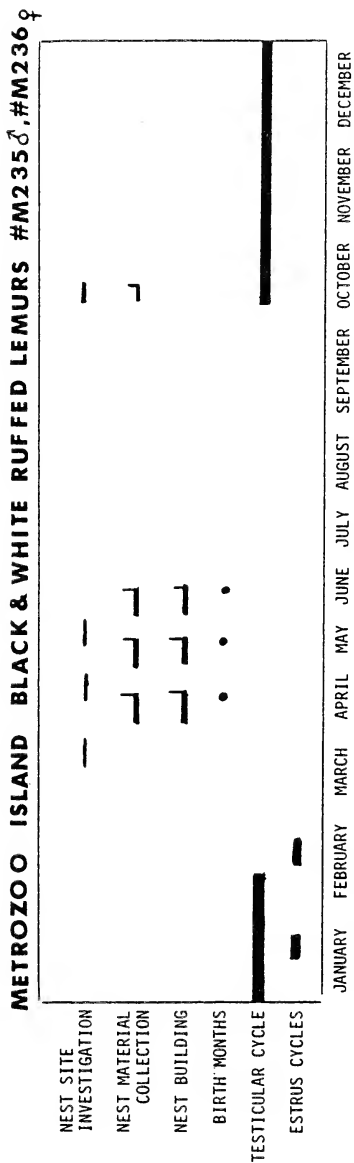


Figure 2.

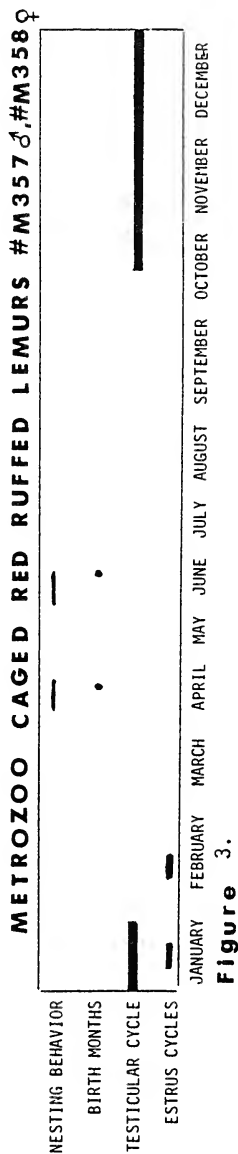


Figure 3.

Nestbuilding Behavior in Ruffed Lemurs at Metrozoo, *Continued*

METROZOO

RUFFED LEMUR MOTHER-REARED LITTERS

RR = Red Ruffed

BWR = Black and White Ruffed

ID#	LOCATION	LITTER #1 /#2 /#3 /#4	TOTAL MOTHER-REARED
#M236 (BWR)	ISLAND #6	1.2 /2.0/0.2DNS/1.1	4.3
#M358 (RR)	LEMUR-Q CAGE #4	1.0 /3.0/1.1	5.1
#M407 (RR)	LEMUR-Q CAGE #2	2.0	2.0

Table 4.

Pereira, et al., (1987) postulates that the construction of nests with branches situated parallel to one another is to assist the neonate in thermoregulation after birth. The neonate is less likely to become wet from urine or rain, thereby, assisting the neonate in thermoregulation in the wild. Pereira, et al., (1987) also found evidence that it is possible that females form a roof or cover to nests, further protecting neonates. At Metrozoo, it is possible we may not see nest roofs due to the presence of nestboxes. The female on our island moves neonates into the nestbox during heavy rains.

Metrozoo has observed evidence of similar nest material arrangements on our island exhibit. There has also been a parallel with increased body temperatures and the inception of parking behavior. The infants were not provided with artificial thermoregulatory apparatus such as heating pads or heat lamps (Graph #5, #6, #7). With this in mind, one may postulate that once a neonate is capable of regulating its own body temperature, the mother may begin to park neonates without protection of the nest.

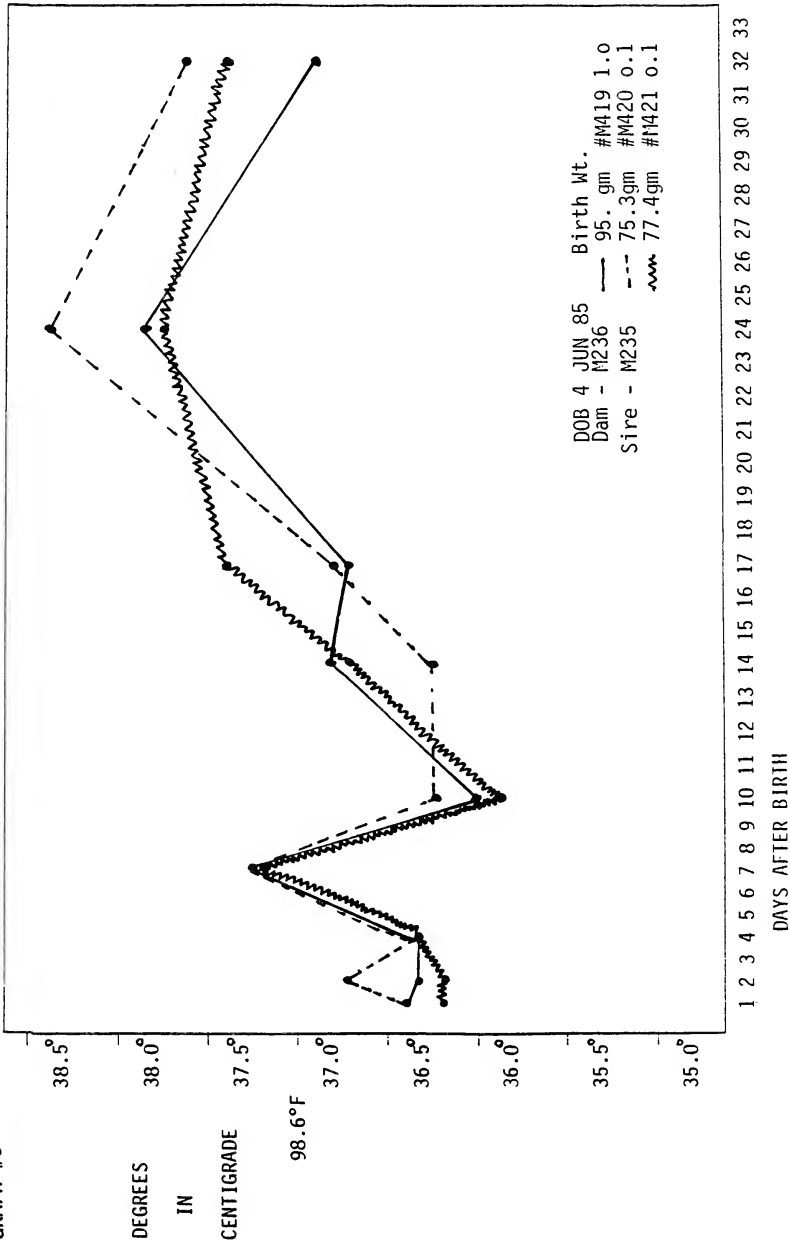
Ruffed lemurs are kept in family units, but off-exhibit families are extended to two litters of offspring. This allows for socialization of juveniles with one litter of siblings. Some aggression has been experienced at feeding time when siblings are near weaning, but it has never resulted in any serious injury. Aggression can be minimized by increasing the number of feeding areas. We have experienced inter-female aggression, but inter-male aggression is rare in adults as similarly experienced by Hick (1984) and Pereira et al., (1987).

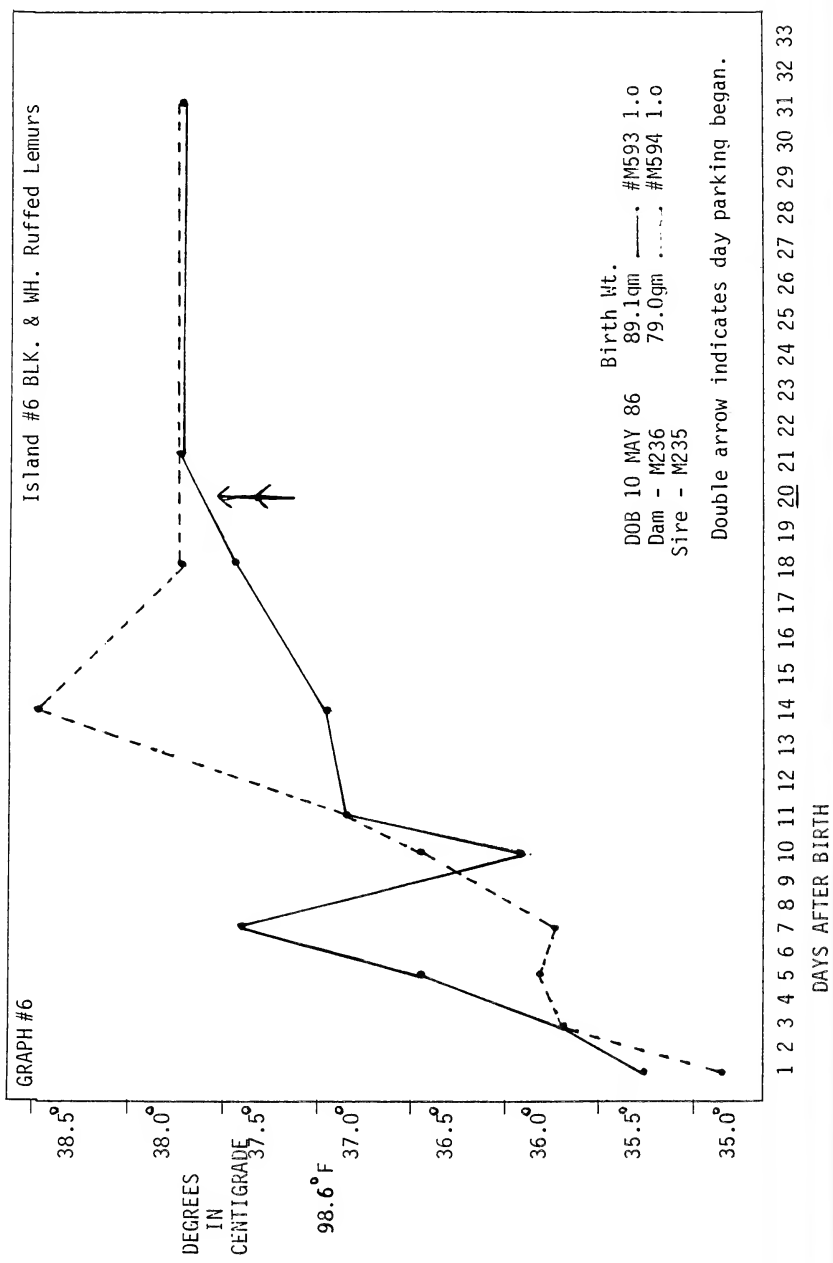
Nest materials are offered in a combination of wood shavings (not sawdust type) to absorb moisture, and coastal hay. Fine shavings can stick to the eyes and nostrils of neonate lemurs, so by adding a barrier of hay, you can minimize contact with shavings. Pregnant females in the off-exhibit cages are given branches to manipulate at nest construction time.

Nest materials used by other zoos are astroturf, pieces of carpeting, wood wool (Europe), wood chips, towels, or no nest materials at all. Wood is usually the best material for construction of nestboxes. Plastic garbage cans have been used in the past, but they are not as weather-proof. Plastic can also tend to contain moisture and if not properly bedded with nest materials, can be hazardous to neonates at the time of birth when there is a large volume of moisture present.

Island #6 BLK & WH Ruffed Lemurs

GRAPH #5

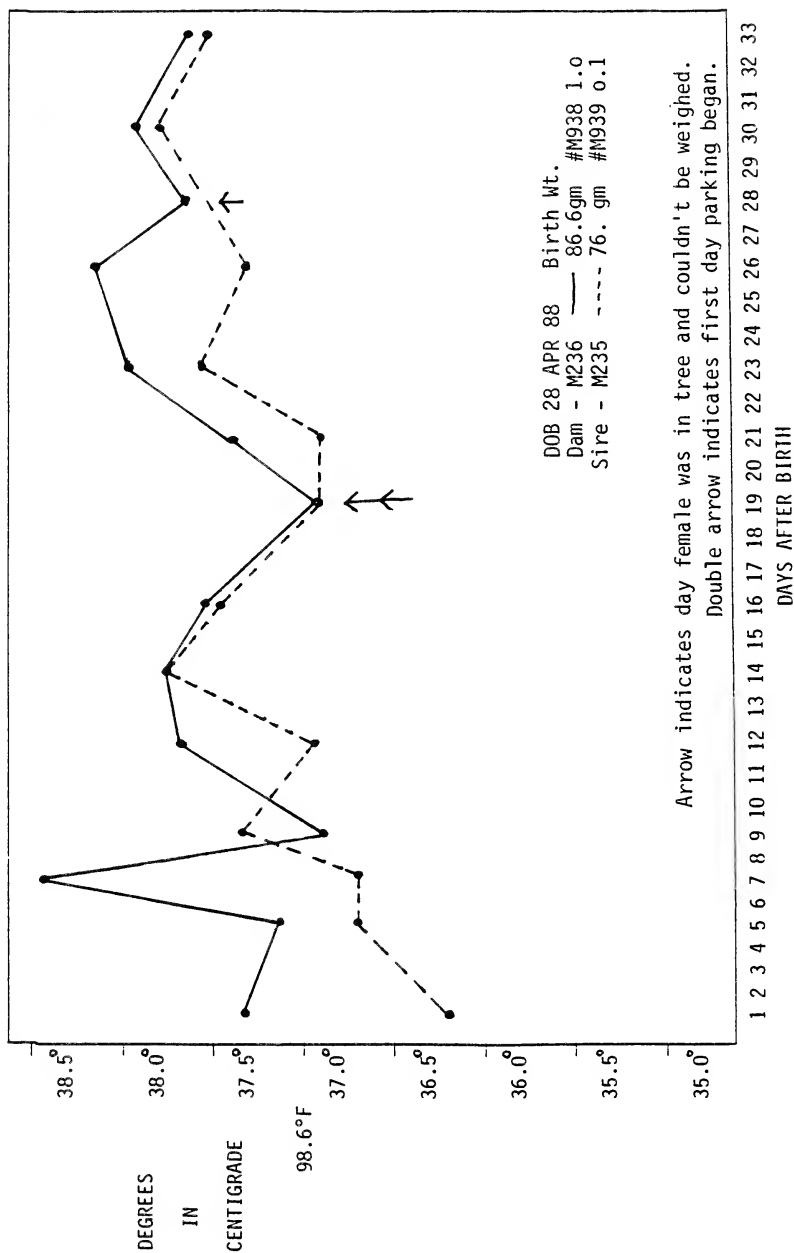




Nestbuilding Behavior in Ruffed Lemurs at Metrozoou, Continued

Island #6 BLK & WH Ruffed Lemurs

GRAPH #7



Nestbuilding Behavior in Ruffed Lemurs at Metrozoo, Continued

Discussion

There is great contrast in the philosophies of the management of the ruffed lemur among American and European zoological institutions. This diversity is quite evident in a dissertation authored by Barbara Palmer (1987), and the results of surveys from British zoos by Blackwell (1984, 1985). This is likely to have occurred due to the variance of enclosures, interpretations of behavior and availability of literature on current findings in primatology. The zookeeper can play an important role in the management of this species if they have a grasp of the fundamental behavioral repertoire of the ruffed lemur and are attentive to physical or behavioral changes in their charges.

In the years since the first pair of ruffed lemurs arrived at Metrozoo in 1984, our knowledge of their behavior has grown. The philosophies of adapting our management practices to encourage more naturalistic use of nest locations while maintaining weight/temperature records on each neonate has contributed to a greater understanding of the growth of mother-reared lemurs at our facility. This data is almost nonexistent on most lemur collections to date.

Metrozoo has experienced parallels in nesting behavior with the Duke Primate Center's ruffed lemurs in their Ambohibe habitat, although differences have been noted in parking behavior. Parking at the Duke facility has been noted as an arboreal activity, while our experiences have shown it to be a terrestrial and arboreal activity. This may be an adaptation to an environment where there are no terrestrial predators. Parking, at Metrozoo, has correlated with neonatal thermoregulation in our mother-reared ruffed lemurs. This would seem to support Pereira's theory of the purpose of nest construction (Pereira, et al., 1987).

It is highly probably that stress can be reduced in captive situations by providing more possible nest locations and materials for females to manipulate, satisfying instincts to nest build. Another practice which could reduce stress in captivity could be allowing the female to relocate neonates as she desires. Ground nest locations proved to be more popular with our females, even when they had a choice of a ground or arboreal nest.

Keepers could get very close to infants making daily checks of neonates a plausible part of their daily routine. This proved to be very important in early detection and progress checks of any physical abnormalities. In one case, the area keeper detected a mild case of funnel chest (pectus excavatum) in a black and white ruffed lemur. In another case, a neonate was born with unusually small eyelids, which caused the lashes to irritate the cornea. This was monitored closely, but the neonate later outgrew the condition.

In closing, it is our belief that a hands-on management technique has great advantages in the captive management of ruffed lemurs. However, it is important for the keeper to evaluate the situation or the behavior of their animals prior to attempting contact with lemurs.

Female ruffed lemurs can be hypersensitive to sounds or movement during their estrus and are protective of young during the first few weeks prior to the beginning of parking neonates. One should move more slowly around them so that are not startled. Treats can be helpful, but do not allow them to be a stimulus for aggression.

Prosimian primates can be very challenging to manage and care for in captivity, but every opportunity must be taken to learn from captive specimens. In Madagascar the ruffed lemur is fighting for survival, but learning more about their behavior leads to improved captive management. Improvement of captive management leads to a more valuable specimen whose worth is reflected in good health and parenting of their own offspring.

Nestbuilding Behavior in Ruffed Lemurs at Metrozoo, Continued

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Nestbuilding Behavior in Ruffed Lemurs at Metrozoo, Continued

Bill Vinson (relief keeper) and Randy Fraelich (alternate relief keeper), the keepers who continued observations on my days off and vacation. The Management of Metrozoo for their support, especially Rick Barongi, Curator of Mammals at Metrozoo, for his guidance.

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ESP: Ecosystem Survival Plan

By
Norman Gershenz and Leslie Saul
Keepers, San Francisco Zoo
San Francisco, CA

There is a metamorphosis taking place in the zoo world today. In the last few years a few individual zoos have started to develop programs and events focused on wildlife conservation and habitat loss. In fact the AAZPA's Public Education Committee has recently drafted a proposal for an International Zoo Conservation Day to focus attention on these conservation issues.

We are all familiar with the incredible array of habitats and the species-rich diversity of the tropics. In fact, two-thirds of the world's species live in the tropics. That includes sixty percent of the bird and mammal species.

However, we also know that habitat loss in the tropics is one of the greatest threats to wildlife today. Fifty acres of the tropics is destroyed every minute, that 74,000 acres every day. The Center for Conservation Biology at Stanford University estimates that 2% of tropical forest is lost each year. This means that in fifty years all tropical forest in the world will be gone - assuming that the rate of population growth and deforestation remains constant. Some put the figure at 20-30 years. And we know that the birth rate is increasing. Based on these estimates, 5-10% of all species will be gone by the year 2000; just 12 years from now.

At present the zoo conservation efforts are fragmented like pieces of a very large puzzle; not quite together yet. We have captive propagation and SSP programs for species like the snow leopard and Asian rhino, but if we want to continue to see snow leopards in the wild we must save their habitat. Other parts of the conservation puzzle include education programs, special events, field research, and release and reintroduction programs like that for the Bali mynah. But zoos are missing a very important piece of the puzzle and that piece is the active participation in the preservation of habitat and the ecosystems in which all animals live.

If you want to save the jaguar forever you must save its habitat and by saving the habitat you get a bonus - not only do you save the jaguar but you save the millions of species that share that habitat; some that haven't been discovered yet.

The Greater San Francisco Bay Area Chapter of the American Association of Zoo Keepers, Inc. has initiated a program this year called ESP - Ecosystem Survival Plan whose goal is to preserve habitats and diversity. We are currently raising funds toward the purchase of critical habitat in cooperation with organizations like the Nature Conservancy, Conservation International, and the World Wildlife Fund.

ESP: Ecosystem Survival Plan. *Continued*

The zoo world has an enormous potential to involve its millions of visitors in the Ecosystem Survival Plan. The attendance in zoos last year was over 114 million; 1.2 million in San Francisco alone. The collective membership of the Nature Conservancy, World Wildlife Fund and other organizations is only a little over one million. The zoo world has a rather large untapped potential regarding wildlife and habitat preservation.

For our first project in the Ecosystem Survival Plan, our Chapter chose the Guanacaste National Park project in Costa Rica. We chose this area because there is less than 2% of tropical dry rain forest left in the world and only .09% is protected. Guanacaste National Park will become the largest protected area in Costa Rica. The reason we like this project is because of a long-term management program, an endowment for the park, preservation of current habitat, and most important and unique is the restoration of damaged habitat. The plan is to rebuild the forest, encouraging tree invasion through seeds dispersed by animals and the wind and with a little help from the people. This would create a 295-square mile national park. The project also has an educational component led by Dr. Daniel Janzen who is one of the world's leading conservation biologists and the driving force behind Guanacaste National Park. Dr. Janzen recently received the Crafoord Award which is equivalent to the Nobel Prize for ecology. The park also includes active participation from the government and from the people of Costa Rica. Once complete, Guanacaste National Park will preserve, protect, and save 30,000 species of insects, 500 bird species, 3000 plant species, 100 mammal species, and 200 species of reptiles and amphibians.

The Greater San Francisco Bay Area Chapter has essentially adopted Guanacaste National Park and is committed to preserving the biological diversity found there. The Chapter is composed of keepers from six northern California institutions at this time - the San Francisco Zoo, Sacramento Zoo, Oakland Zoo, San Jose Zoo, Marine World Africa/USA, and the Micke Grove Zoo. We have designated \$600.00 in funds raised through membership for the Ecosystem Survival Plan, and an additional \$800.00 has just been donated as a challenge grant as the result of an article written in the Chapter newsletter. To date we have raised \$2000.00 and purchased 16 1/2 acres of tropical dry rain forest forever!

Guanacaste National Park has raised \$8.2 million in donated land and cash since 1986 and needs \$3.5 million to complete this project. That's a lot of bake sales! So our Chapter has come up with a fundraising concept which is the installation of an interactive exhibit located inside each zoo. We will transform a normal parking meter into a conservation (not to mention conversation) tool with the accompanying graphic that says "GIVE YOUR CHANGE TO MAKE A CHANGE" and at the same time tell the public about the Ecosystem Survival Plan and how saving habitat will save wildlife. Presently the San Francisco Zoo, San Jose Zoo, Oakland Zoo, Micke Grove Zoo and the Sacramento Zoo have already agreed to the installation of these meters. 100% of the funds will go directly towards the purchase of habitat in Costa Rica.

So just what does your money buy? \$300.00 buys your 2 1/2 acres of tropical dry rain forest...forever! And not only do you get acreage but you get .005 of a tapir, 200 orchids, 10,000 mushrooms, 200 frogs, .1 agouti, .04 anteater, 1 million ants, .24 of a tinamou, .03 howler monkey, and 4.7 billion raindrops. Do you have any idea what \$300.00 buys you in downtown Los Angeles? 1 square foot! You get more diversity for your dollar in the tropics.

We feel that the Ecosystem Survival Plan can tie in perfectly with events like International Zoo Conservation Day, Recycling Awareness Week, and all conservation educational programming.

The benefits for the zoos are many. First off you are saving millions of species of plants and animals in one fell swoop. Two, you are providing a way for zoo personnel and the public to actively participate in saving these species forever. If we want to save the animals

ESP: Ecosystem Survival Plan, Continued

in the wild we must preserve their habitat. That is the only way they will survive in the wild. Three, zoos can take their animal collection and SSP programs and link them with the Ecosystem Survival Plan giving them a broader impact in their conservation efforts.

ESP has something for everyone. If your SSP is the Asian one-horned rhinoceros, then you could target the forests of India and Nepal as you Ecosystem Survival Plan. If it's the golden lion tamarin then your focus would be on the Brazilian rain forests. And if it is the manatee then your ESP would involve the American Everglades.

Our hope is that this approach to conservation...that of habitat purchase and protection --will be embraced collectively by the public and the zoo community. And that we will be able to piece the conservation puzzle together by planting the seeds of thought and action.

The survival of any and all species of animals depends upon a complex mosaic of interactions. As biologists, curators, secretaries, educators, directors, keepers, exhibit designers, gardeners, graphic artists, horticulturists, fundraisers, writers and people we must be part of the interactions that help conserve wildlife today. And the zoo world will finally be able to say...we are preserving the diversity of life on earth.

Acknowledgments

First and foremost we would like to thank Dr. Daniel Janzen for his commitment and dedication to the Guanacaste National Park and the Ecosystem Survival Plan. Also to Brandy Pound, Education Director of the San Francisco Zoo, for her wisdom and overall unending support. Many thanks to Brad Zlotnick of the Center for Conservation Biology, Stanford University, and Miriam Schulman for use of slides of the wildlife and wildlands of Costa Rica. Our appreciation goes out to Ben Beckman and Ray Abinanti of the San Francisco Parking Meter Authority for turning parking meters into a conservation vehicle. Finally, to Ruth Norris of The Nature Conservancy, Washington, DC, who saw the potential in ESP from the very first instant.

(Editor's Note: At the 14th National AAZK Conference in Tucson, AZ, Rich Block, Director of Public Programs for the World Wildlife Fund, presented the 1988 WWF Conservation Award to the Greater San Francisco Bay Area Chapter for their development of and efforts towards the Ecosystem Survival Plan. This award is given to projects which are AAZK Chapter initiated and supported. Congratulations to all members of the GSFBA Chapter for their commitment to a most worthwhile and innovative conservation project!)



Opportunity Knocks

Institutions wishing to advertise employment opportunities are asked to send pertinent data by the 15th of each month to: Opportunity Knocks/AKE, 635 Gage Blvd., Topeka, KS 66606. Please include closing dates for positions available. There is no charge for this service and phone-in listings of positions which become available close to deadline are accepted.

GREAT APE KEEPER...requires one year experience with great apes. Will assist Animal Technician and participate in ape husbandry program along with cats and some hoofstock. Salary \$1,241-1,635 per month, benefits. Send resume **by 4 January 1989** to: Earl Unell, Chief Examiner, Personnel Department, 414 East 12th Street, Kansas City, MO 64106. EOE.

KEEPERS...requires two years experience with birds or reptiles. Degree in biology or related science desirable. Salary approximately \$20,000 plus benefits. Please send resume, letter detailing experience and career goals, with three letters of recommendation **by 15 January 1989** to: John Groves, Curator of Amphibians, Reptiles and Birds, Philadelphia Zoological Gardens, 34th St. & Girard Ave., Philadelphia, PA 19014.



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PINS AND CHARMS: Enameled three-quarter inch pins and charms with the official AAZK logo are done in the same colors as the AAZK patch. The charms are suitable for necklaces. Price per pin or charm is **\$3.50**.

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CONFERENCE PROCEEDINGS: The following issues available at the prices listed.

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Co-Directors of Regional Coordinator System

States East of Mississippi - Diane Krug, Rt. 1, Box 273, Hilliard, FL 32046 (904) 225-9559 [work]

(904) 845-4279 [home]

States West of Mississippi - Debbera Stecher, Woodland Park Zoo, 5500 Phinney Ave., North, Seattle, WA 98103. (206) 625-5402 [work] (206) 745-8198 [home]

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Peter Buchholz, Bronx Zoo, New York, NY 10460 (212) 220-5154 [w] (718) 229-7711 [h]
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for the states of MI, IN, KY, and OH

Chris Garland, North Carolina Zoological Park, Asheboro, NC 27203

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AAZK would like to announce the following new RCs: Elandra Aum for the states of WA,OR,ID,MT,WA and AK; Colleen Kinzley for the states of WI,IL,MO,MN and IA; and John Branagan for the states of PA,DE,NJH,MD and Washington, DC. Also please note a change of address for Vivki Bohnert, RC for the state of Florida. Vacancies still exist for {1} the states of LA and MS and {2} the states of ME,VT,NH,MA,RI and CT. If you are interested in either of these RC positions, please contact one of the RC Co-Directors for more information.

Until the vacancies are filled, those who have questions should contact the following individuals who are temporarily covering the states with vacancies: Tim Kurkowski, Zoo Atlanta, for the States LA and MS; and Chris Garland, North Carolina Zoo, for the States of ME, VT,NH,MA,RI and CT.

Need membership information? Want to learn more about AAZK or start a Chapter or become more active - then call your RC! They will be glad to assist you with any information you need about AAZK.



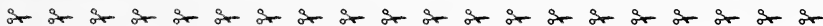
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The Diet Notebook is a copyrighted publication of the American Association of Zoo Keepers, Inc., and may be ordered by filling out the following form and sending it, along with a check or money order (U.S. FUNDS ONLY) made payable to "AAZK Diet Notebook" to: Diet Notebook Order, AAZK, 635 Gage Blvd., Topeka, KS 66606 U.S.A.

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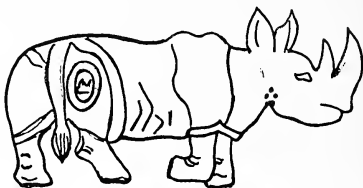
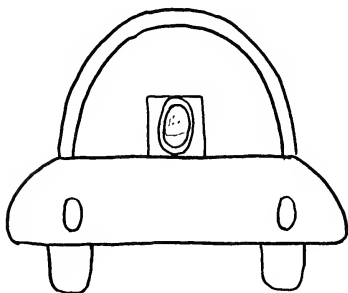
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AAZK Keeper Training Video Tape Project

The goal of the AAZK Keeper Training Video Tape Project is to produce quality video tape training programs suitable to supplement existing in-house training of entry level keepers. These tapes are not intended to be a complete training program in themselves. All proceeds generated from the sale of training tapes will be used to finance production of future training tapes. Two tapes are currently available.

Zoo Keeper Safety: An Attitude Adjustment - This 18-minute program does not attempt to address the numerous variable specifics of this subject. It presents a safety approach to the job of zoo keeping, and promotes constant awareness and personal responsibility for safety.

A Zoo Keeper's Introduction to Feeds and Feeding - A half-hour introduction to the complex subject of feeds and feeding of zoo animals. Topics covered include what, when, and where to feed.

AAZK Keeper Training Video Tape Purchase Agreement Responsibilities and Restrictions of the Buyer

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Attention Fellow AAZK Members

The AAZK Milwaukee Chapter now has coffee mugs available to purchase. These beige porcelain mugs feature the National AAZK Rhino Logo design in dark brown.



Cost of the mug is \$1.50 which includes postage/handling.

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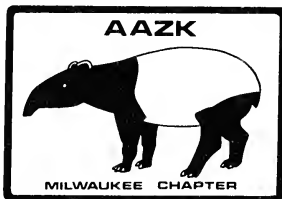
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"I'VE APPROVED YOUR TRANSFER, CURLY.
I'M TAKING YOU OFF MOUNTAIN GOATS."

Notice to Members on Membership Renewal Procedures

Over the years there seems to have been a considerable amount of confusion on the membership renewal process, especially in reference to how long a member is maintained on the AKF mailing list before being dropped. Hopefully the following outline will help explain the renewal process and if this format is followed by renewing members, there should be no interruption in their AAZK/AKF mailings.

1. Three months before a member's expiration date, a card notifying them of their need to renew their AAZK membership is sent.
2. At the beginning of the month in which an individual's membership is to expire, they are sent a "Final Reminder" card. If the member renews within the expiration month, there is no interruption in mailings. If a member fails to renew within that month, their name will be dropped off the active computer mailing list and they **WILL NOT** receive the next month's issue of AKF. (i.e. if you are due to renew in July and do not do so, you will not receive the August issue.)
3. If a member renews his/her membership after the expiration date, they will be reactivated on the mailing list. **HOWEVER**, depending on what time during the month the renewal is received, that person may end up missing up to two copies of the Forum. We have a cutoff date with our mailing service to provide them with the current label mailing list. If the renewal comes in after that date, that name will not be added to the list until the next month. This cutoff date is normally the 27-28th of each month as we try to have the current AKF in the mail the first Friday of each month.
4. After a member is dropped from the mailing list for (1) failure to renew or (2) failure to notify National Headquarters of an address change, and subsequently renews, they are **NOT** sent back issues which they may have missed due to late renewal or failure to notify National of an address change. These missed issues may be purchased for \$2.00 per copy, but will not be sent free.
5. Members are also reminded that the Association pays 30 cents return postage due for each AKF we receive back from the post office because of an outdated address. It is **VERY** important that members send in address changes ASAP to avoid this expense to AAZK. We want you to receive all your mailings in a timely fashion, but we need your help. Your prompt reply to your renewal notice and/or notification of address changes is greatly appreciated.

**Prompt Renewal Saves AAZK Time and Money
and Assures You Current Mailings**



AAZK Membership Application

Name _____ Check here if renewal []

Address _____

_____ \$25.00 Professional
Full-time Keepers

_____ \$20.00 Affiliate
Other staff & volunteers

_____ \$25.00 International
*All members outside the
U.S. & Canada*

_____ \$15.00 Associate
*Those not connected
with an animal facility*

_____ \$15.00 Library
Library subscription only

_____ \$50.00 Contributing
*Organizations and
Individuals*

Directory Information: Zoo: _____

Work Area: _____ Special Interests: _____

Mail this application and check or money order (U.S. CURRENCY ONLY PLEASE), payable to American Association of Zoo Keepers, Inc., to: AAZK National Headquarters, Topeka Zoo, 635 Gage Blvd., Topeka, KS 66606.

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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. Telephone 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 Ext. 31.

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

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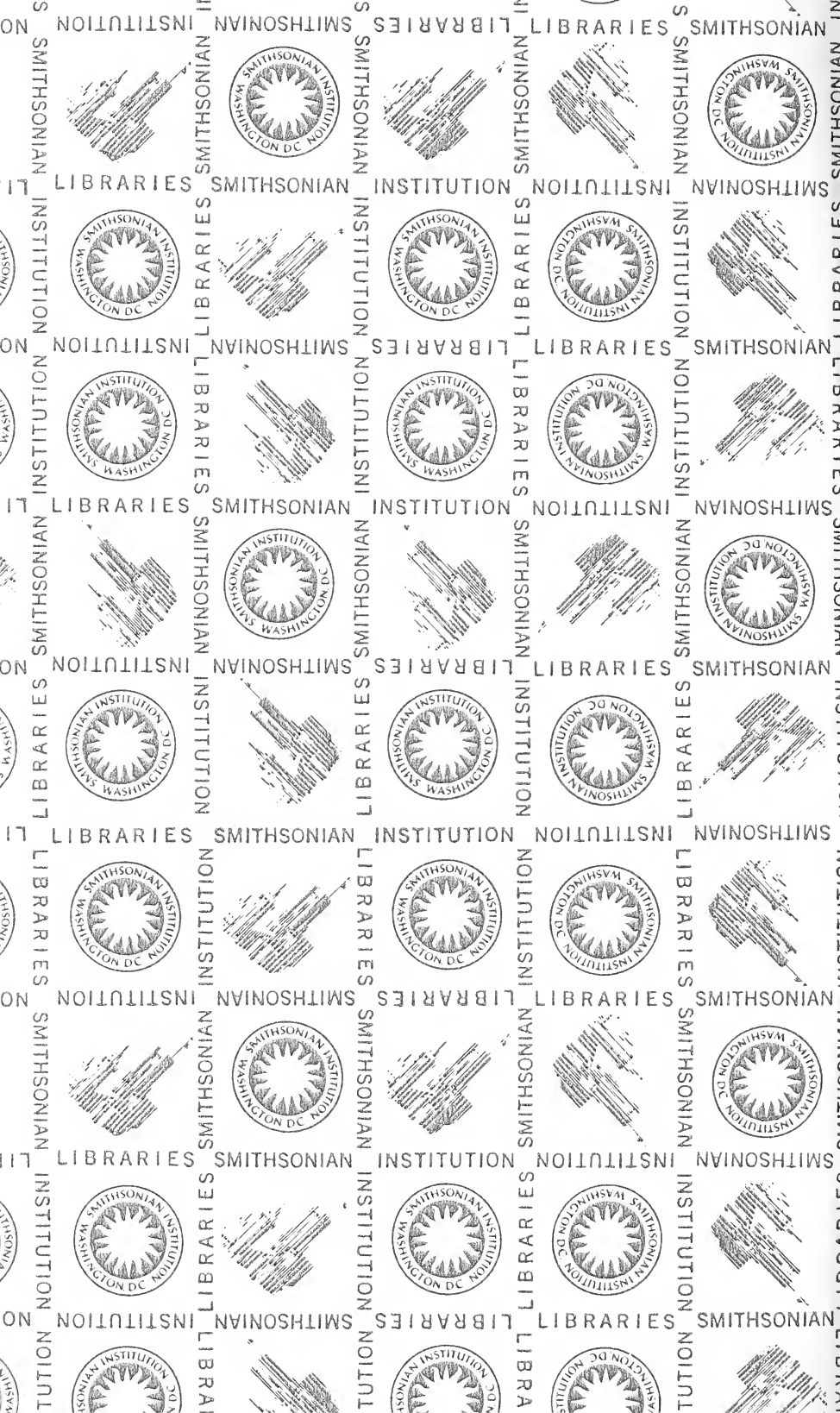
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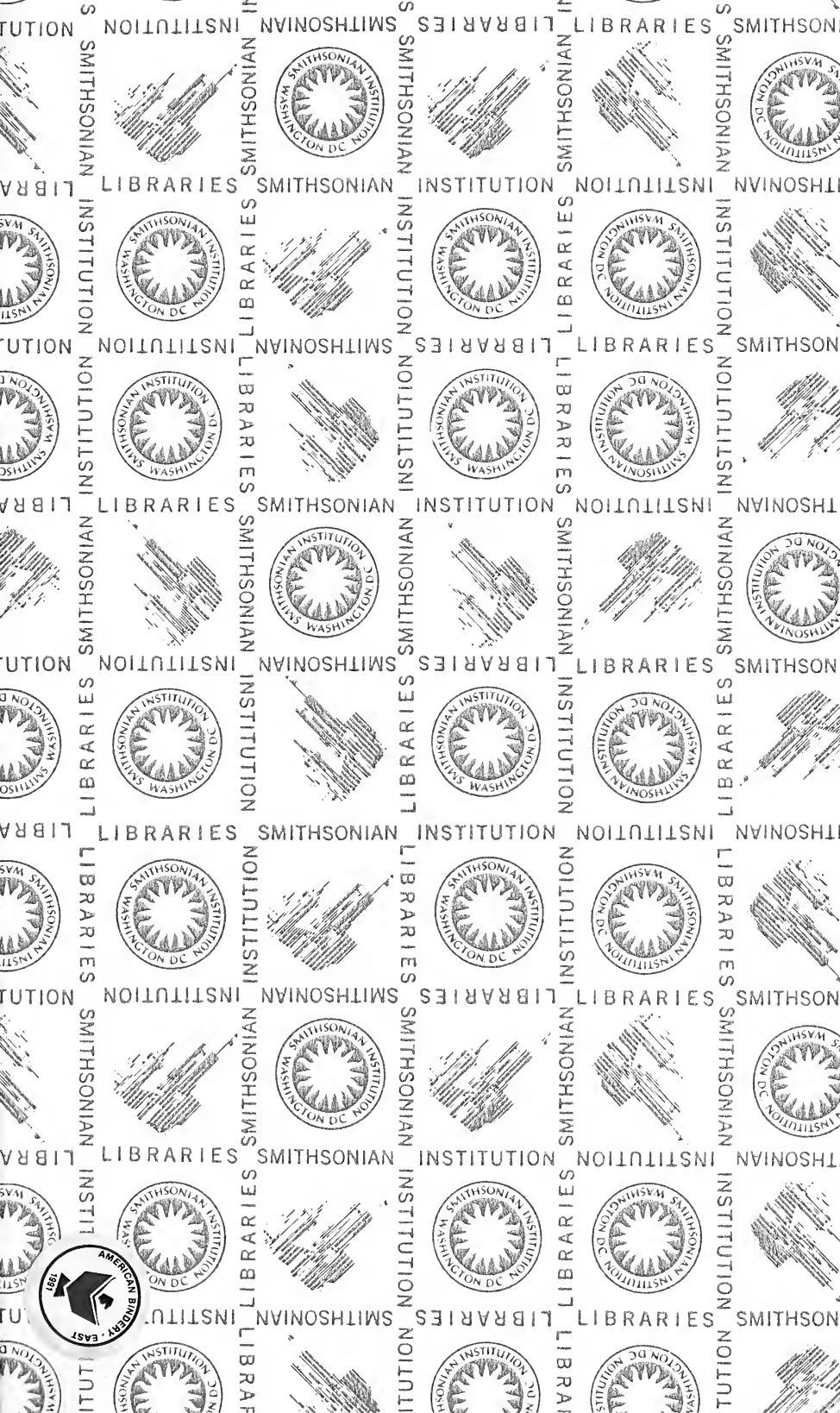
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