



Pet a Panda?

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ALIVE

ZOOLOGICAL SOCIETY
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This fascinating report of a 20th century ark appeared in *Science Digest* in June. The author, a psychobiologist Ph.D., is an editor of *Sexual Medicine Today*. It is reprinted with permission from *Science Digest*. Copyright 1981 by the Hearst Corporation.

If you look at an Arabian oryx from just the right angle, its two long, straight spiraled horns blend into one, and you can easily see why so many people think this shy white antelope inspired the legend of the unicorn.

In its native Middle East, the Arabian oryx, like the mythical unicorn itself, was thought by some to possess magical powers; to kill one became a sign of manhood. By 1967, not one Arabian oryx was left in the wild; they had been hunted to extinction and only a handful remained in a few zoos around the world.

Scientists at the San Diego Zoo, however, think they may have a solution of the oryx's population problem — mass production. Using hormone injections, they plan to induce a donor female Arabian oryx to superovulate as many as 10 or 12 ova (eggs) in a given cycle instead of her usual single egg.

After mating her, they will "harvest" her embryos and freeze them. Then at their convenience, they will thaw the embryos and place them in the uteri of 10 or 12 receptive females of another closely related but not endangered species.

These exotic animal experts feel they will be able to increase the offspring production of a single mating of the oryx — or of nearly any endangered mammal in the world — by a factor of 10 or more.

The only theoretical limits would be the number of eggs they could hormonally encourage a female to produce during each cycle and the number of surrogate mothers they could find to carry the embryos to term.

By exchanging frozen embryos, semen and ova with other zoos, they hope to minimize the problems related to inbreeding among the stock.

Rachel is a scimitar-horned oryx. Her two long horns spiral back over her head in a pair of graceful parallel arcs. Scimitar-horned oryx are also endangered but not nearly so severely as the straight-horned Arabians.

Rachel cannot know this, nor can she know that the survival of both her own species and that of her Arabian cousins is directly related to what happens to her during the next couple

of years, for Rachel is being groomed to become a surrogate mother. It is hoped that she will become the first scimitar-horned oryx to give birth to an Arabian oryx calf.

Her esteemed status has earned Rachel special privileges: she has her own "apartment" — a small, shaded, very private enclosure out behind the main research building at the San Diego Zoo, far removed from the noise and bustle of crowds and gawking visitors who might upset her and so disrupt her delicate reproductive processes.

Rachel also has a roommate — a small castrated ram called Bud, who keeps her company, plays with her and so keeps her happy.

Rachel is the pet project of reproductive physiologist Dr. Barbara Durrant. Rachel is quite tame and will even tolerate strangers near her, provided they speak softly and move slowly.

On the other hand, she trusts Durrant implicitly and will, among other intimacies, urinate into a beaker for her on command and allow her to manually palpate her ovaries through her rectum. Both procedures are useful for assessing her fertility and eventual pregnancy.

With only a tranquilizer or nothing at all, Rachel takes in her stride many manipulations for which other animals would have to be anesthetized.

Scientists such as Durrant are working desperately against the clock to learn the reproductive secrets of the oryx and the few other endangered exotic animals they will try to save and to use this knowledge while they still have specimens to work with.

The San Diego Zoo researchers have made commitments to save the following animals:

- The lowland gorilla, which could become extinct in the wild within 10 years.
- The pygmy chimpanzee, perhaps the most intelligent primate next to man (only about 32 left in captivity).
- The lion-tail macaque, of which there are only about 300 in captivity.
- Przewalski's horse, a Mongolian ancestor of the domestic horse that might once have been ridden by Genghis Khan's warriors and which has been considered extinct in the wild since 1967.
- The douc langur, a small, handsome primate that was almost wiped out by American defoliation of Vietnam and is still being hunted by Southeast Asians.
- The little brown Cretan goat, which still roams free but in steadily diminishing numbers

THE FROZEN ZOO

By Lane Lenard

The scientists have placed a lot of their eggs in Rachel's basket — if not yet in her womb.

While the promise of embryo transfer seems to provide many species their only hope of surviving, the reality still lies somewhere between the test tubes of the physiology laboratory and the reproductive organs of the animals themselves, awaiting just the right combination of technology, know-how and circumstance.

The home of the San Diego team's efforts is a rather drab room in the research building containing two waist-high gray freezers that someone with a sense of history has labeled "Frozen Zoo: Twentieth-Century Ark."

"Right now the Frozen Zoo contains cells representing virtually every species of animal on earth," says Durrant. "Mostly, these are kidney, spleen and liver cells for chromosome studies that help us in making breeding decisions."

Durrant is currently working to increase the supply of gametes, or germ cells — sperm, eggs and fertilized eggs of endangered animal species for use in artificial insemination, in vitro (test-tube) fertilization and embryo transfer procedures.

For many of the species whose germ cells reside within the freezer at — 384 degrees Fahrenheit, a place in this twentieth-century ark could be their only chance of making it to the twenty-first century.

Says the San Diego Zoo's director of research, Dr. Kurt Benirschke, "It is very probable that since so many animals are fast disappearing from the wild, one day we'll be breeding many species only in zoos."

Dr. Durrant foresees the not-so-distant day when all zoos will have their own icy arks in which to store the germ cells and embryos of all their animals, along with detailed genetic information about each so that zoo breeders can make informed mating decisions.

The zoos could use the genetic material locally or exchange the sperm, eggs and embryos with one another — and so maintain genetic diversity in their colonies without having to keep a large number of animals on hand and without having to risk shipping their rare animals great distances to mate.

While the number of stored sperm and ova in the San Diego freezers is still small, it is growing steadily.

So far, the only embryos on ice are those of Barbados sheep — a nonendangered species that is serving as a test vehicle for working the bugs out of the embryo-transfer procedure.

A demonstration shipment of some of these Barbados sheep embryos will be the first items in a new exchange program to which the San Diego and Cincinnati zoos are now committed.

Embryo transfer, per se, is a well-established procedure that has revolutionized the livestock business. It is now commonplace for the frozen germ cells of prize breeding cattle to be shipped cross-country or around the world for selective breedings; it is simpler, safer and cheaper than moving the animal merely to send frozen sperm or to mate a cow locally, then ship frozen embryos and reimplant them in a surrogate-mother cow.

But procedures worked out in one species, such as cattle, provide only the bare bones of the procedures that will eventually work in other, more exotic species such as the Arabian oryx or the lowland gorilla.

"For every species that you want to work with, you have to start at square one," explains Durrant, "because the details of the reproductive cycle are so different. And when it comes to most exotics, we know almost nothing."

"For each new species you have to get the bugs out first, figure out the cycle: How frequent? How long? What season? What are the normal hormone levels between cycles or during ovulation or gestation? What will be the animal's response to injected hormones or to anesthetics? "We try to work from domestic animal models, but it takes years, and extrapolation to the exotics does not always work."

For the Arabian oryx, Durrant and her colleagues started with a distant but familiar relative, the domestic cow, to determine safe and effective dosages of hormones and anesthesia. Then they reduced the dose according to the lower weight of the oryx — an educated guess at best.

And with a limited number of endangered animal subjects to experiment on, each injection becomes an adventure.

"Every animal is an individual," Durrant cau-

tions, "and potentially will react differently to drugs and to hormones."

To show first that embryos other than those from cattle could be removed, frozen, thawed and transferred, Durrant produced Crystal, a female laboratory rat that began her life in the reproductive tract of a female rat, was removed as an eight-cell embryo and frozen for six weeks.

Then the embryo was thawed and placed in the uterus of another female rat, which gave birth to Crystal 16 days later.

Crystal was normal in every respect and later went on to become a mother of normal rat pups herself.

When you freeze embryos, sperm, ova or any tissue that is later to be revived, you don't just drop them into the deep freeze.

"Living cells are full of water," Durrant points out. If frozen too rapidly, ice crystals would shoot out as the water changed from a liquid to a solid, and the cells would rupture like an exposed water pipe in winter.

To prevent this, the embryo is first washed in a cryoprotective agent that draws a little of the water out of the cells. "Then we freeze the tissue at a very, very slow, very, very even rate."

When researchers later thaw the microscopic embryo, how do they know if it is still alive?

One method is simply to implant it in a surrogate mother's uterus and hope for the best. Another is to place the embryo in a growth medium and see if the cells continue to divide.

But both these procedures are extremely wasteful of the researchers' three most precious resources: money, genetic material and time.

The best technique is a recent development: newly thawed embryos are washed with a special substance that makes them glow in the light of a fluorescent microscope. Depending on the specific substance used, either only living embryos or only dead embryos will glow.

Precise knowledge of the reproductive cycle of both the mother and surrogate mother is necessary if the scientists are going to know when to mate the mother, when to remove the embryos from her reproductive tract and when to reimplant them in the surrogate mother.

The cycles of the laboratory rat and other domesticated animals are well known, but until procedures were recently developed for assaying hormone levels in the urine of exotic animals, the only ones who knew for sure when an animal such as an oryx or a gorilla was in heat was a male of the species (unless the animal was anesthetized and her blood

tested — a very risky procedure).

The urine test, which was developed by Dr. Bill Lasley at the San Diego Zoo, requires a keeper to watch the female and, when she urinates, to quickly draw some of the urine off the ground into a syringe.

This is no easy task with the combination of an easily spooked wild animal and the hot, dry southern California climate that evaporates the urine within a few minutes.

(The advantages of having Rachel urinate on command are evident.)

Urine collections over an extended period reveal peaks and valleys in the metabolites of the two female sex hormones estrogen and progesterone, indicating where the animal is in her reproductive cycle.

The method is exceptionally precise. While Lasley was developing his urine test, he collected samples from the women working at the zoo research center and was soon able to tell them within a few hours when they would begin menstruating each month.

Embryo transfers within a species such as cattle or rats are hard enough. When an embryo is transferred to a surrogate mother from another species, however, the difficulties multiply in proportion to the distance between species.

The first consideration in selecting a surrogate mother is genetic: how closely related are the biological mother and the surrogate?

Dogs and wolves or lions and tigers could make good matches, but lions and snow leopards or sheep and goats probably would not.

It has been proposed by some that human females might be able to successfully carry endangered gorilla fetuses, although no one is seriously proposing this as a means of saving the gorilla from extinction.

Other factors to be matched up are the size of the full-term fetus, the size of the adult animal, the length of the estrous cycle (the period from ovulation to ovulation), the length of the gestation period, the nature of the hormonal environment during gestation and the way that the embryo attaches to the uterine wall.

The first steps in making Rachel a surrogate mother have already begun. Her reproductive cycle has been charted and found to be normal and regular.

Durrant will initially test the superovulation and the embryo-harvest procedures that will later be used on the Arabians. Fortunately, scimitars and Arabians are very closely related — one might even be a subspecies of the other — and Durrant anticipates a close

match. "But," she emphasizes, "you never really know."

After she has been superovulated, Rachel will either be mated with a male scimitar or artificially inseminated with scimitar sperm, and the resulting 8 to 12 embryos will be removed a few days later and safely stored in the Frozen Zoo for later use.

The researchers are at present undecided about which fertilization route to follow: a natural mating would increase the probability of fertilized ova, but Rachel, hand-raised by Durrant, has never even seen another oryx, and no one knows how she would react to a male's attempt to mount her.

To "harvest" the embryos, Durrant and her colleagues will soon use a newly developed nonsurgical procedure on Rachel. A special fluid medium is forced into her oviducts via a catheter, and the embryos will simply be washed out into a glass dish with the help of gravity and manual palpation of her genital tract.

Having a tame Rachel on which to practice such procedures contrasts sharply with the difficulties researchers will have when skittish Arabian oryxes will be their subjects.

Because they will not let humans near them, everything done to an Arabian must be done from long range and, as a result, at greater risk to the animals. Hormones and medications as well as tranquilizers and anesthetics must be administered from a distance using a well-aimed blowdart.

Ranchers Know Value of Embryo Transplant

Ranchers across the country are breeding a race of supercattle — bigger and more muscular for better beef.

Through the use of embryo-transplant technology, prize cows can now produce dozens of healthy embryos each year that can then be carried to term by lower-grade surrogate mothers.

In 1980, Rio Vista Genetics in Texas, the largest commercial cattle-embryo operation in the world transplanted 5,000 embryos, charging up to \$2,500 per pregnancy if the rancher owned the donor cow and up to \$5,000 if he didn't.

President Brent Perry boasts of a record 86 healthy pregnancies from one donor cow in a single nine-month gestation period.

Most embryos are transferred without

Any close-up inspection or simple blood test requires that the animal be anesthetized via blowdart, a particularly dangerous procedure. "It is very difficult to predict how an individual animal will respond to a given dose," says Durrant.

An anesthetized animal might just lie down and go quietly to sleep, but it might also run into a wall, stumble and break a leg or simply roll over and die.

"Five milligrams of M-99 (a standard anesthetic) will knock down a four-ton rhino," the physiologist points out, "but when we sent some people to Africa to capture some giant elands (a species of antelope that weighs about 500 pounds each), fifty milligrams wouldn't even slow them down." Afraid to increase the dose, the hunters came home empty-handed.

Durrant's voice expresses both trepidation and relief as she describes one attempt to artificially inseminate Bouba, the zoo's 30-year-old female lowland gorilla, using sperm from her male companion, Abe. Though Bouba and Abe have been together for years, she has always refused his advances.

The artificial-insemination procedure required that both gorillas be "knocked down" almost simultaneously so that semen collection could be followed immediately by insemination (performed by a local obstetrician-gynecologist enlisted for this unusual mission). "It's a very scary business to anesthetize two lowland gorillas of their size and value — about \$30,000

freezing, since the success rate for freezing, thawing and transplanting embryos is still only 25 percent.

When improved, freezing will have staggering ramifications: a single container with 1,000 embryos could be shipped overseas for less than it now costs to export a single prize bull.

And susceptibility of "test-tube" calves to foreign disease may be eliminated entirely, because embryo calves could pick up immunities through the surrogate mother's bloodstream and milk.

Texas A & M researcher Duane Kraemer foresees production of identical-offspring embryos by using a form of cloning.

Looking forward to the ultimate breakthrough, he says, "The next logical step is cloning parents, but that's a big step."

to \$35,000 apiece and on the brink of extinction," Durrant recalls.

"If we had killed one by accident, it would have been horrible. Fortunately, our veterinarians are well experienced with primates, and we can rely heavily on their knowledge, expertise and quick wits."

Once they are satisfied that the superovulation and embryo-collection procedures are working well on Rachel, the scientists will try the crucial embryo transfer experiment: removing an embryo from an Arabian oryx and placing it in Rachel's uterus, where they hope it will grow normally to term.

Two other embryo-transplant experiments tried by the San Diego team both failed for reasons that provide lessons in the frustrations of research on exotic species.

In the first experiment, an embryo from a Cretan goat was to be implanted in the womb of a common pygmy goat, which is about the same size — 40 pounds. Another Cretan goat embryo was to be implanted in a more distant relative, the Barbados sheep.

Finally, as a control to see if the procedures themselves were sound, a Barbados sheep embryo was to be transferred from one Barbados ewe to another.

Since the embryos were to be transferred directly and not frozen (researchers wanted to avoid the added complication of freezing at this early stage of testing), it was necessary to synchronize the estrous cycles of donors and potential surrogates to within four hours of each other to ensure that the embryo would be placed in a uterine environment that was ready to accept it.

To make the uterine environment even more inviting to the alien embryo, it may be desirable to place a native embryo into the uterus along with the foreign embryo.

As Durrant points out, "The 'native' pigmy embryo may set up the environment necessary to maintain the pregnancy, and then the Cretan embryo just goes along for the ride."

This procedure is only possible, however, in species in which the surrogate mother normally has multiple births. Bovids (sheep or antelope), Cretan goats, Barbados sheep and most primates are thus excluded, but pygmy goats are good candidates.

Synchronization of the estrous cycles was accomplished by implanting under the females' skin a hormone package that released four milligrams of progesterone per day at a slow, steady, almost natural rate. When after 14 days, the implants were removed, all the animals' ovaries began working simultaneously.

On day 10 of this induced cycle, the donor animals were superovulated and went into heat together — well, at least the pygmy goat and Barbados sheep did; nothing seemed to happen to the Cretan goat. The male never seemed interested and they never mated — while anyone was around.

But apparently they did when no one was looking, for when the scientists surgically probed the little Cretan goat's reproductive tract three and a half days later expecting to find nothing out of the ordinary, they discovered that she had not only superovulated but had mated, and they removed 10 embryos. The scientists were ecstatic.

Then another problem arose. Shortly before his planned mating, the male pygmy goat got into a head-butting contest through a fence with a much larger Barbados ram and was killed. The female pygmy refused to mate with another male, and the Cretan embryo transplanted by itself into the pygmy-goat surrogate failed.

The Cretan-Barbados transplant, which Durrant concedes was a long shot, also failed to take. To the researchers' great joy, though, the Barbados-to-Barbados transplant worked beautifully.

Later that year, in a repeat of this experiment, the Cretan goats failed to mate altogether.

Nevertheless, the team was encouraged. That the Barbados-to-Barbados transfer worked showed them that their basic procedure was sound and that they needed only to shake the bugs out for the various species.

"We learned that we could synchronize the reproductive cycles of animals of the same species and of different species," says Durrant, "and that we had the right hormone dose to superovulate the Cretan goat."

"We learned when they come into heat after superovulation, and we also learned that we can't count on seeing their mating behavior."

The difficulty in getting the Cretan goats to mate underscores another serious problem that researchers must overcome in a different way with each species.

"You can't just put a male and female together and expect to get babies," notes Durrant. "Every species has its own conditions for mating."

For some animals, mating in captivity is no problem. Lions, for instance, mate readily, and as a result, many zoos have had to castrate or spay some of their lions or put them on birth-control pills in order to keep the lion population under control.

"Cheetahs," points out the zoo's research

director, Benirschke, "will not breed if left indefinitely in pairs. They must be separated when the female is not in heat."

"A white male rhinoceros will only mate if he is the dominant male in a large territory with several females and a few male rivals to make a contest out of it."

Antelopes such as the Arabian oryx require privacy before they will mate."

Attempts to get the two giant pandas, Ling-Ling and Hsing-Hsing, at the Washington National Zoo to mate have so far been fruitless. Since attempts at artificial insemination have also failed, the researchers are trying a new tact — they are bringing in another male panda from the London Zoo in the hope that competition between the resident male and the visitor will stir something up.

Among nonmammals such as birds or reptiles, it is often impossible for zoo personnel even to know which two animals to pair up.

In some birds, size and plumage give no clues to human eyes, and until recently, the only way to tell male from female was a stressful and sometimes fatal blood test.

But San Diego's endocrinologist Bill Lasley has now adapted his urine hormone assay to this purpose. By looking at the ratio of estrogen, a female hormone, to testosterone, a male hormone, in the animals' excrement, Lasley has learned to tell the sexes apart.

But since the ratios for each species may be different, much basic research is needed

before he can reliably use the test on a given animal.

Research director Benirschke foresees the day — "and it is not far away" — when manipulation of life seeds like those in the Frozen Zoo will be the only way that zoos will be able to maintain stocks of animals.

Benirschke, who is in his fifties, was a physician specializing in the problems of human reproduction, but a few years ago he switched his commitment to endangered animals.

"I've given up on investigating human life," he told one interviewer. "We have too many people, and we're killing the wildlife."

I feel very strongly that the reason we have so many people is that we understand human reproductive physiology. I feel it's time we translated this to the other species that we're in the process of eliminating."

"It's very frustrating," echoes Barbara Durrant. "We'll probably wind up saving very few species, and most will have to go by the wayside," she says.

"All of us are very emotionally involved in the fate of these animals."

But she's not dismayed. "If we get down to one vial of semen, we'll still keep going."

If we get down to a single frozen ovum and a single vial of frozen semen, we'll try in vitro fertilization and then put the embryo in the closest relative we can find.

As long as we have a germ cell, we'll find a way. We don't give up easily."

Semen Collected for National Sperm Bank

Among the dedicated scientists working to save endangered species is Dr. Stephen Seager of Texas A & M University, who may be champion semen collector.

Seager travels the globe taking samples from rare animals and then storing them in a new NIH-sponsored national sperm bank.

Seager has recently traveled to China to collect giant-panda semen and to help artificially inseminate some captive beishung. So far only the Chinese have successfully inseminated a giant panda, but Seager hopes to learn their secret.

Semen is collected by a process called electroejaculation, in which a low-voltage probe inserted into the anesthetized

animal's rectum stimulates the release of the valuable fluid.

Anesthetization, however, makes this a risky procedure, so researchers such as Dr. Barbara Durrant of the San Diego Zoo never miss an opportunity for a "free" collection.

"We had our orangutan 'down' to have his teeth fixed," she recalls, "so we electroejaculated him and put his semen in the freezer."

The small volume of primate ejaculations also makes artificial insemination a problem. King Kong fantasies to the contrary, the gorilla is no sexual giant; a stallion produces an impressive 95 cc, notes Durrant, but the greatest of the apes usually manages less than 0.25 cc — about the volume of a couple of teardrops.

Kawata Head Curator

Milwaukee County Zoo now has a general curator, Ken Kawata, 44, a native of Japan who came to this country in 1969 and became a citizen in 1977.

He has primary responsibility for the animal collection day-to-day maintenance, its various programs such as breeding and reorganization, and for animal-care personnel.

His connection to zoos goes back to his childhood in Tokyo when he began writing letters to the zoo director several times a year. It stood him in good stead when, as a Miyazaki University junior, he applied to become a student keeper. His name, by then familiar to the zoo director, got him the job, he thinks.

Kawata finished at Miyazaki with a degree in veterinary medicine, then to his horror, contracted tuberculosis. He was sick for two years.

"In Japan," Kawata said, "being someone who has had TB is like being an ex-con in this country. You are out of the mainstream for good." He would never be able to get a government (civil service) job — which meant he was finished in zoos in Japan.

The editor of the Tokyo Zoological Park Society retired and Kawata got the job. He edited and published a monthly magazine, *Animals and Zoos*, for six years.

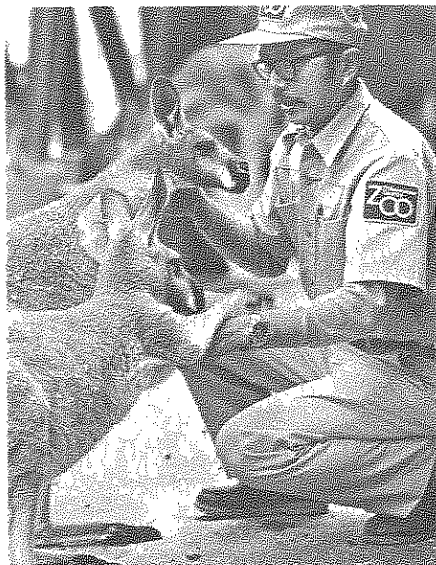
It had its benefits, Kawata pointed out: "I became a generalist, gained a broad scope, and developed an ability to write." (He still publishes one technical paper a year, a demand he makes on himself "to renew my citizenship in my professional circle.")

Typically, an individual in Japan is "a part of the whole" Kawata said. "One does not retain a strong identity as a person. Yet, I was raised not to be docile, not to be a submissive member of society — to be myself. In this my parents had Western ideas.

"There is an old Japanese proverb: 'A male that sticks out should be pounded down.' Time after time," he said, "I was pounded down."

Writing and publishing a children's book, *Animal Tales*, resulted in royalties sufficient to pay his way to the U.S. He lived in Los Angeles with a friend and looked for a job with a zoo. Gary Clarke, Topeka Zoo director, hired him and Kawata got his work permit. The required permanent visa was another matter. He was turned down as over-qualified.

Determined to have him on the staff, Clarke applied again, this time up-grading the job title to zoo management trainee. He got the visa for Kawata who remained in Topeka three years.



Greg Anton Photo

"I had a rebirth in that little town in Kansas," Kawata says. "It was a sentimental, emotional experience — to feel acceptance of myself as an individual. I am indebted always to Gary Clarke."

The next three years found Kawata as curator at the Indiana Zoo. Then it was Oklahoma's Tulsa Zoo where he became general curator and a U.S. citizen, earned his master's in education at Northeastern State, and joined the faculty at Claremont College to teach zoo management.

Why Milwaukee? "I wanted this position to advance myself," Kawata said. "Milwaukee has one of the largest collections of animals and the best looking zoo in the United States — and I've seen them all. This is the major league."

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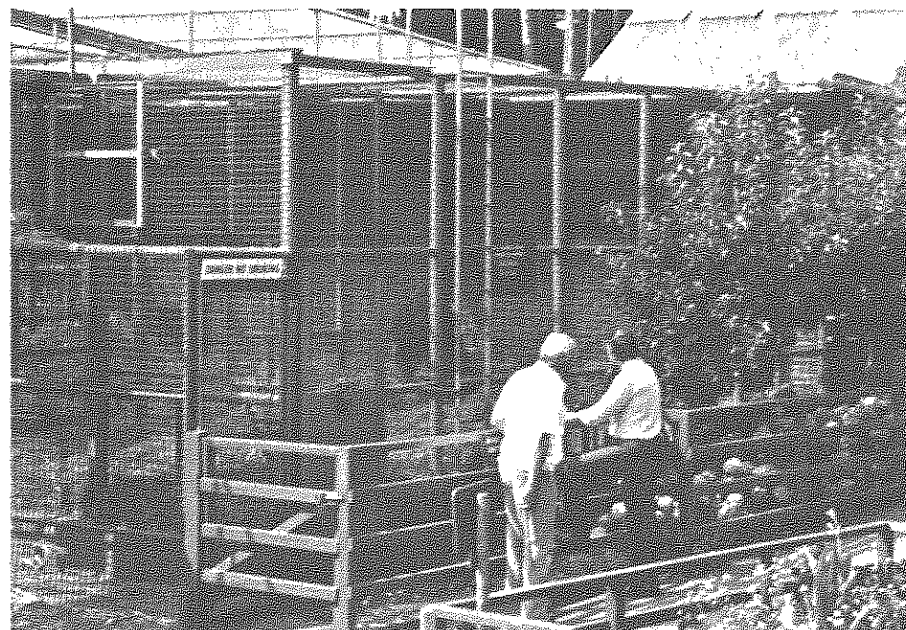
Gorilla Research Takes Director Across Europe

Looking at one of the smaller breeding facilities for gorillas in John Aspinall's private zoo, Howletts Park, outside of London, left, and Milwaukee County Zoo director Gilbert K. Boese.

Boese's gorilla-facility research, underwritten by the Zoological Society, undertaken with an eye to a Great Apes facility here, took him across Europe to visit a variety of zoo gorilla compounds.

Aspinall's zoo contains outstanding gorilla facilities occasionally seen on television here, among them the huge open-air mesh gym in which up to 25 of the magnificent creatures can climb, swing, wrestle, and play.

Aspinall is an admirer of Samson, refers to him in his book "The Best of Friends" as the most impressive primate he has ever seen. The latest of his regular trips here to see Samson was in September.



James R. Boese Photo

Yessir! Pet a Panda!

Zoological Society Director A.D. Robertson, its president in the early 60s, on the June tour of China sponsored by the Milwaukee Museum, answered from the heart when asked by the Chinese tourist service what he most wanted to do. Most want to see the Great Wall. "Pet a panda," said Robertson.

The hands-on experience occurred at the Xian Zoo, China's newest, in the interior province Shaanxi where pandas are raised. Xian has seven, exhibits three.

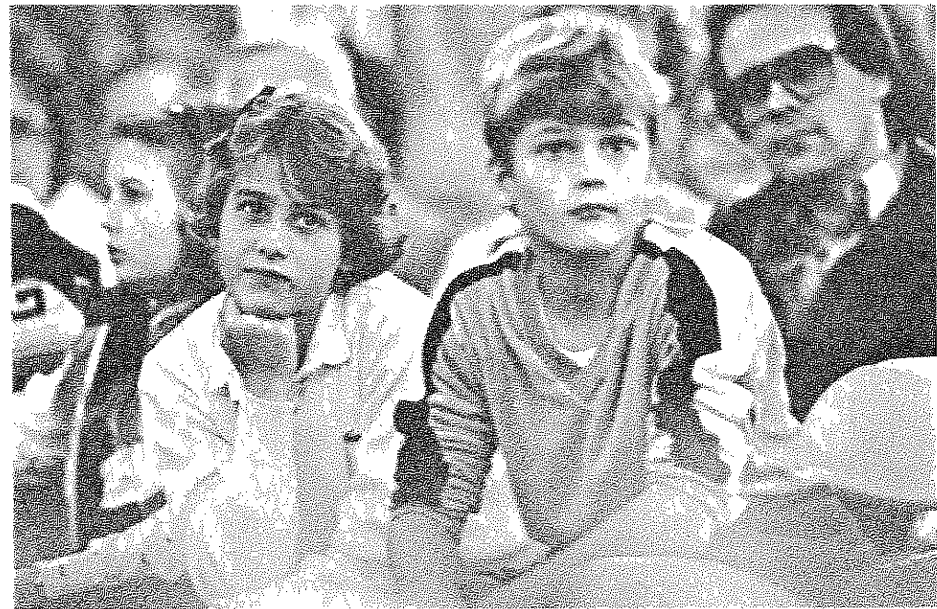
The Milwaukee group watched their fellow American stroke a 6 year old, 250 pound male. "You could get in the exhibit with them," said Robertson, "and, yes, I did."

"Can we take him home? we asked. These animals are the property of the people of China came the reply. And it isn't the money," Robertson said. "The days of the panda elsewhere are over. They are extremely endangered. There a billion people in China, and only seven zoos that have pandas, from two to seven each — not as many as they would want to have for themselves."

"Zoos are very popular in China," Robertson said, "offering a chance to observe animal life we probably can't appreciate. The Chinese have no pets. They are prohibited in the cities because they eat too much, and during the famine, everywhere, they were eaten. Nor are there wild birds — none at all. They ate those, too."

The Xian Zoo also offered Robertson a chance to see the golden haired monkey from northern China — there are none elsewhere — and Mongolian ponies.

Animals in Chinese zoos have a great time, according to Robertson, a result of their exceptional relationship with zoo workers. The necessity to "employ" everyone in the communist state means that manpower in zoo operation is extensive, no corners are cut — and the animals thrive.



71st Annual Meeting

A colorful report on gorilla life and times by Lincoln Park Zoo director Lester E. Fisher highlighted the Society get-together here October 16. It was the 71st Annual Meeting of the Society held to conduct business and focus on the zoological scene.

Above: the crowd assembled in the yellow and white tent erected on the lawn just south of the Zoo administrative wing.

Left: unidentified children of members during the Fisher talk.

Below, left to right: Tom Eisenhut provides background music during the reception that followed; Zoo concessions supervisor Russ Lamb checks the popcorn wagon staffed by Jill Elsby; Fisher greets Mary Fran Cahill (center) and Society Director Dorothy Pain.

The day dawned bright and held off forecasted rain. The tent was heated, the beer cold. See you next year.

Greg Anton Photos Here and Following



Retiring Society President Thomas S. O'Byrne, right. Director Frederick L. Ott, below.

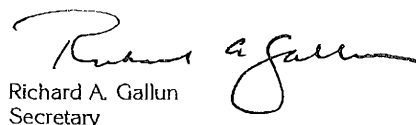


President O'Byrne reviewed Society activities and accomplishments for the year concluding, among them:

- More than doubled Society membership (now 8200) with direct mail and newspaper advertising campaign.
- Revised membership classes and dues to Regular \$25, Contributing \$50, Sustaining \$100, Corporate \$1000, Life \$1000 once, Patron \$500, Life Patron \$5000 once.
- Appointed new Executive Director Carol Moore Waite.
- Remodeled the former Ed-Zoo-cation lab to become the Discovery Center in the Children's Zoo.
- Undertook the architectural planning study for the Visitor/Education Center planned for the Zoo.
- Backed pre-school education pilot project funded by Faye McBeath Foundation \$15,000.
- Sought and received \$34,000. Institute of Museum Services grant for Zoo education department.
- Continued financial support of Zoo professional development, Zoo education department, membership in the American Association of Zoological Parks and Aquariums — the accrediting agency.
- Continued animal purchase and development and renovation of exhibits.
- Continued to back Zoo efforts to preserve endangered species.

Zoo Director Gilbert Boese remarked briefly on Zoo highlights. Meeting adjourned at 7:45.

Respectfully submitted,


Richard A. Gallun
Secretary

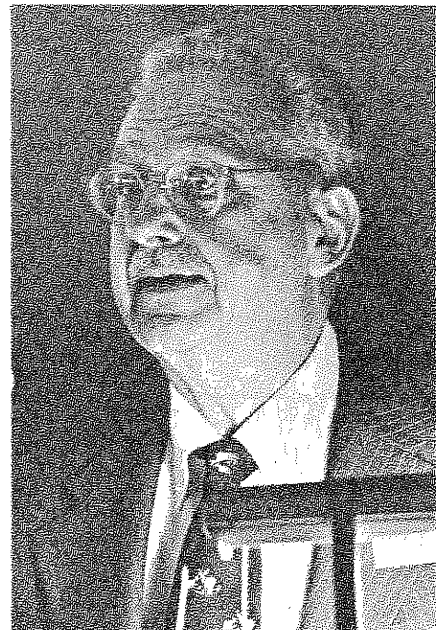
Meeting of Members

The 71st Annual Meeting of the members of the Zoological Society of Milwaukee County was called to order in a tent on a lawn at the Zoo at 7:30 p.m., President Thomas S. O'Byrne presiding. Attendance estimate: 800.

A moment of silence was observed to honor the memories of deceased Directors Walter E. Kroening and Courtland R. Conlee, both of whom died in 1981.

The minutes of the previous Annual Meeting were accepted as summarized by Director James H. Kuehn, as was the summary of financial condition by Treasurer Richard D. Gebhardt. Introduction of the directors present followed.

Director Frederick L. Ott represented the Nominating Committee in placing the following in nomination for Director for terms to



expire in 1984: Steven M. Dearholt and Robert A. Kahlor, for terms to expire in 1983: Ann McNeer and Bernard C. Ziegler III; and the following in nomination for re-election for terms to expire in 1984: Richard A. Gallun, John A. Hazelwood, James H. Kuehn, Thomas S. O'Byrne, Ralph Olsen M.D., George La Budde, and James Taylor.

Members present voted to affirm the choice of the Nominating Committee and cast a unanimous ballot.

New Society President Richard D. Gebhardt, right. Sandi Moomey, president of Pride, below.



Meeting of Directors

The 71st Annual Meeting of the Directors of the Zoological Society of Milwaukee County was called to order at 7:45 p.m. immediately following the 71st Annual Meeting of the members, President Thomas S. O'Byrne presiding.

The minutes of the previous Annual Meeting of the Board of Directors were accepted as summarized by Director James H. Kuehn.

Zoo Pride president Sandi Moomey noted Pride accomplishments of the year.



- Staffed the Zoo information booth throughout the summer.
- Furnished tour guides on regular and special basis throughout the year.
- Staged special events for children: Halloween, Easter Egg Hunt, Turkey Days, and Zookeeper-For-A-Day contest.
- Presented birthday parties for children by special arrangement, complete with tour, treats and birthday cake.
- Expanded animal watch to 24-hour capability.
- Raised \$1000 for Zoo hospital equipment.
- Provided clerical services to Society offices.
- Grew to over 300 members.
- Volunteered 9700 hours.

Director Frederick L. Ott represented the Nominating Committee in placing the following slate in nomination for officers for one year October 1, 1981 to September 30, 1982: Richard D. Gebhardt, President; Richard A. Gallun, Vice President; William M. Chester Jr., Treasurer; James H. Kuehn, Secretary.

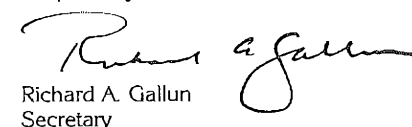
Directors present voted to affirm the choice of the Nominating Committee and cast a unanimous ballot.

Mr. O'Byrne presented the gavel to newly elected President Richard D. Gebhardt. Mr. Gebhardt remarked the reports given during the evening attested to the type of leadership Mr. O'Byrne had provided. He said we are a Society and a Zoo on the threshold of a new and exciting era, made possible by the combined efforts of Mr. O'Byrne's administration.

Mr. Gebhardt concluded he looked forward to the Society's continued growth in size and purpose, and expressed appreciation for the time and energy, the interest and support, and the unique qualities of leadership Mr. O'Byrne had brought to the Society, the Zoo and the community.

The meeting adjourned at 8:05 for the illustrated presentation GORILLA! by Dr. Lester E. Fisher, Director, Lincoln Park Zoo, Chicago. Reception followed.

Respectfully submitted,


Richard A. Gallun
Secretary

ZOO AIMS FOR GENETIC DIVERSITY

An Interview of Zoo Director Gilbert K. Boese Conducted by Wilma Boese

To bring this subject title a little more clearly into focus in terms of zoos today, would you first discuss the more intensive involvement and emphasis in breeding animals, especially those endangered, and the consequent commitment of zoos to a more orderly plan and principled breeding program outlined by the Species Survival Plan?

It is becoming apparent to zoos today that the animals they hold in their collections could very well be extinct by the turn of the century or substantially reduced to the point that survival as a species is doubtful. It becomes then the task of any zoo to decide which species it will try to save and then set up an orderly breeding management program for this species. To bring these individual zoo efforts into joint participation and critical species focus, the Species Survival Plan of AAZPA has been implemented. This will pool together a group of zoos committed to breeding and preserving a specific species so that their efforts can collectively work toward a given species survival.

As late as 10 years ago, 80 percent of the hoof stock found in zoos was provided by wild-caught stock. Today it accounts for less than 10 percent. What has happened to change this?

Because of the difficulties of species in the wild and the rapid development of zoo technology in breeding and raising animals, we can decide not to take animals from limited wild resources because we have the ability to provide needed stock through captive breeding programs. We can then leave the wild stock to develop and be utilized as selected genetic inputs to enrich the captive breeding program.

Breeding loans have increased from a few hundred three years ago to over 400 last year. How has this altered the relationships among zoos involved in breeding loans?

Zoos have moved from consistent purchase of animals into the realm of breeding loans. Breeding loans provide zoos with the option to develop a wide array of breeding programs and yet not lose ownership of its animals. It is not too unlikely in the near future that owning animals will become a thing of the past. That a species collection in captivity will become the ownership of those organizations working with that species and the role of the specific zoo with that species will be decided for the sake of the species rather than for the sake of ownership.

Animals, of course, are still bought and sold. What would be the determining factors you would consider in establishing a contractual agreement to buy a particular animal for a specified price, or as an option, in attempting to enter into a breeding loan agreement with a cooperative institution (private party for that matter) to obtain that same animal for breeding possibilities at Milwaukee County Zoo?

Zoos will purchase animals rather than enter into breeding loans when a breeding loan option is not available. There are still purchase options from private dealers or from foreign countries. Although costly, these, at certain times, are the only means by which a zoo can continue or expand its species holdings. The breeding loan, however, is the option favored by many zoos, including Milwaukee County Zoo.

Inbreeding in zoos in the past created problems for animal preservation. What zoo policy changes benefiting from this painful hindsight, are the essential ingredients in helping to establish a more species-preservation-oriented breeding plan within zoos as major breeding institutions, and between cooperating institutions. Would you name a few?

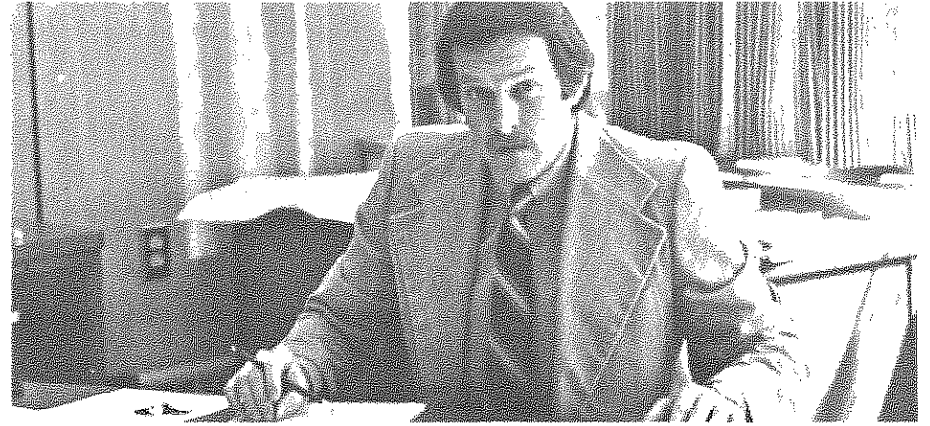
As animal husbandry progressed and captive breeding developed, this victory brought with it another problem — inbreeding. Zoos with the capability of breeding selected species in captivity must now implement multi-generation plans to select out and bring in animals to its breeding population. The goal is to keep as much genetic variability as possible in a zoo's collection.

Will you give us a sampling of today's costs in purchasing outright when they are available?

Animals are costly because most animals that are sought and can be purchased are those that are not breeding well in captivity and those that a number of zoos desire. Thus, the law of supply and demand. For example, a trio of proboscis monkeys can cost \$35,000 to \$50,000. A single endangered Hunter's hartebeest can cost \$35,000. An Indian rhino can cost as much as \$100,000.

By contract, how would you handle an animal trade-off with another institution or party?

When the zoo decides to expand its species holding, it will in present day go to ISIS, the International Species Inventory System, and request a computer readout of the available



Eugene Schiada, photo

animals and their genetic background. With this information in hand, the zoo can then research to see what is the best individual (or individuals) for the program. Concurrently, a good zoo will contact the species studbook keeper and request the keeper's input on the placement or acquisition of an animal. Thus, these two options provide the best scientific method of bringing breeding animals together. Here we have used both means to develop breeding programs. For example, Shambala went to Rome due to the advice of the studbook keeper of snow leopards in Helsinki.

After you've done a search for a particular animal, and are convinced that you've found the best one available for Milwaukee County Zoo's breeding program, would it be justifiable to say that you may have to convince a potential lending institution that you will make them an offer they can't afford to turn down? It sounds to me a little like dealing in a futures market, in as much as the inherent risk depends on how many births of offspring are yielded. In the final analysis, who gets what, and when, if the mating of two animals is successful and produces young?

A breeding loan is an equitable agreement between two or even three zoos. The agreement is simple — the zoo that houses the animal is responsible for its care and upkeep. Any young that are born are distributed to the participating institutions on a pre-agreed upon formula.

The next logical question is what might occur if a mating in a breeding institution utilizes time, money, medical resources, and absorbs shipping and other costs to help assure this happening?

Breeding loans do result in the risk that animals involved will breed. We assume that our efforts will result in breeding. So, there is risk involved in the fact that one can spend overhead on a project which may not be successful. However, with the tools of animal management that we have, we feel we are cutting this risk factor to a minimum.

With the expectant projected loss of wild animals from their natural habitat, the emphasis on species genetic diversity is an ultimate consideration in zoo breeding. What do you think zoos will be doing in the near future to provide animals for their exhibits? Is the variety of species important to zoos? Is this a topic that should be discussed in depth by itself, perhaps?

Genetic diversity will be difficult to sustain in captivity even with the work of studbook keepers, ISIS and SSP. The concept of sperm banks, frozen ova taken from all captive populations and wild populations will be the next step to maintaining genetic diversity in captive animal populations.

What will all this do for the average zoo goer? Will zoos appear to be slanted toward breeding priorities? Are these difficult choices for zoos? Are these drastically new priorities? Are new ethics in the making for most major zoos?

The effect of conservation programs on the average zoo goer is being felt already. Most major zoos committed to conservation have reduced the number of species they exhibit. They have increased the amount of space per species so although there may be fewer species observed, the viewer can take pride in the fact that the zoo is showing the animal in a manner that more nearly duplicates its natural condition, a way that has a greater probability of assuring that species survival for future generations.

A discussion of species survival in zoos is one that covers many more aspects of modern animal management. The concept of breeding loans and genetic diversity discussed here is just the beginning of what will be everyday considerations in modern zoo management.

Boese Safari Ready

The migration of millions of wildebeest and zebras will be viewed by Society members participating in the East African safari headed by Zoo Director Boese in February. It is the first Society-endorsed African safari undertaken here.

Participants will leave February 11, travel through London to Kenya and Tanzania, and return February 28. They will visit Aberdare National Park, Lewa Downs, Samburu Game Reserve, Lake Naivasha in the Great Rift Valley, Ngorongoro Crater, Serengeti National Park, and Lake Manyara National Park.

Among sightings indicated in the itinerary are elephant, rhino, buffalo, forest hog, bongo, crocodile, reticulated giraffe, beisa oryx, Grevy's zebra, lion, leopard, hyena, cheetah, topi and kongoni.

Registration, limited to 20, is underway. Interested parties may call the Society office 258-2333.

How Do You Do? I'm Zachariah Zoo!

The Introduction of a Symbol by Carol Moore Waite

Noah of the Ark and Zachariah Zoo
Met when the rain stopped, just after 2:00;

Just after Noah, lookin' around the Ark,
Prayed the mighty waters would take it to a Park;

Take it to a Park where all the two-by-twos
Could gather up their rations and terminate the cruise.

You see ol' No was leveled — he'd been working overtime
Through those 40 days and 40 nights of floating maritime.

He needed Rest. He need Peace. He needed Off-The-Ark.
But till the two-by-twos were safe, he couldn't disembark;

For more than Rest, and more than Peace, and more than Off-The-Ark
He needed reassurance that his float was not a lark.

He needed reassurance that the world cared much as he
For the saving of the species he had tried to referee.

Enter Logic. Enter Wisdom. Enter Zachariah Zoo
In a scene but for his presence would be Noah's Waterloo.

There he stood, Concern Incarnate, in a Zoologic Park
Thrust above the churning waters like a stationary ark.

"Over this way," bellowed Zach'ry. "I'm a-comin'" answered No
As he paddled toward this vision who'd escaped the undertow.

"I've got kittens, mice and monkeys, snakes and sloths and kangaroos.
I've got guppies, goats and Geoffroy's, emu, finch and cockatoos.

"I've got lions, tigers, zebras. I've got giant pachyderms.
I've got creepy crawly lizards, grubs and chubs and slimy worms."

Noah shouted as he neared him, naming everyone on board
(Some who honked in jubilation, some who mewed and some who roared);

Just in case old Zachariah wanted out before he docked
He named every single creature in his international stock.

"They are welcome here Forever!" thundered Zachariah Zoo.
"Saints preserve us!" cried the creatures, exclamation ringing true.

"Open now the doors to steerage. Open cabins fore and aft
Find your partners," shouted Noah. "Disembark this crowded craft."

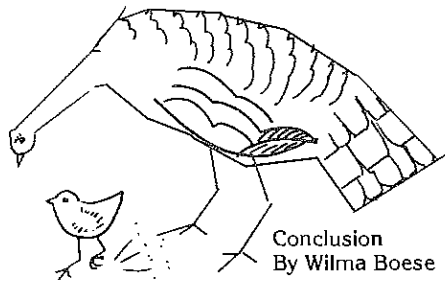
Two-by-two they left old Noah, two-by-two went down the plank,
Two-by-two they entered gardens fast by Zachariah's bank . . .

So it was the creatures lasted. So it was they made their marks.
So it was that Zoos were started — as a follow-up to Arks.

Zachariah Zoo and (clockwise) reticulated giraffe, Japanese brown shrike, Indian elephant calf, eastern box turtle, cottontail rabbit, weasel, gopher tortoise, raccoon, white-tailed deer fawn, long-tailed field mouse, African lion cub, Florida purple-wing butterfly, eastern kingbird. Artist Tim Tews. Watch for Zachariah Zoo in every issue of *Alive*.



IRMA AND THE CHICK



Conclusion
By Wilma Boese

I watched Irma, the wild turkey, and her chick in early summer. Irma is a good mother. She taught her chick to lie very still. Irma does that too. You do not see them if they are still.

On days when the summer sun was hot, the chick would lie in the petunia flower bed. It was cool there under the flowers. The petunia bed is in front of the food stand by the big lake.

Children ran to Irma who walked about near the petunia bed. The children did not see the chick resting in the petunia bed. It lay so very still.

The children talked to Irma. They threw her popcorn and bits of food. Irma pecked at the food but she did not eat it. She did not go far from the petunia bed and her chick.

Irma's chick grew and grew. Its yellow fluff feathers became gray and dull brown. A stubby feather crown grew on the chick's head. The chick was a young peafowl. It was not a turkey.

I saw Irma alone late in July. I looked for Irma's chick. Every day I looked. July was gone. Irma was still alone. I did not see the chick again.

The month of August came. I saw Irma with a mother peafowl. Two little yellow and brown fluff chicks followed the peahen. Do you think Irma wanted those chicks? Irma did not take them.

Now Irma is alone again. I talk to her. I think she knows me. She stops and looks at me. Sometimes she makes soft chuckle sounds.

Come see Irma. You can see how beautiful the zoo woods are where Irma lives. The leaves on the maple and oak trees have turned yellow, red, and brown, and are falling on the ground.

Era Ends When Two Oldtimers Leave

Looking for work in 1955 similar to what he enjoyed as a boy on a farm, Odean Schneider went after a zookeeper's job. On his first day of work he got a new name, Duke, and 10 years later a new title, animal superintendent. He supervised animal care and keeper schedules thereafter.

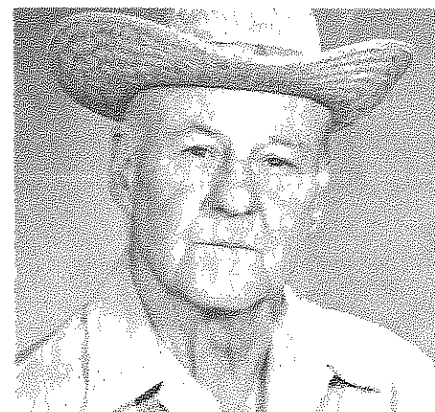
"The old zoo," said Schneider, "oh, it was terrible. Dilapidated. Smelled. And the equipment was poor. And so much smaller than this.

"I helped move the old zoo over here," Schneider said. "It began when the expressway went through first the elephant house, then the bear dens, then deer, camel, zebra, giraffe... oh, what a job — but interesting!"

"And now what a nice place we have. Cleaner, neater, and now that they're charging to get it, a better grade of people — people who care.

"Our greatest achievement here was raising moose," he said. "We found a way by freezing boxes of wood (to use for browse) but the cost killed us."

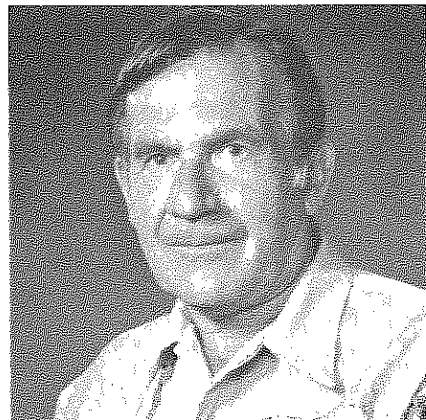
Schneider, who officially retired in March, said



Schneider

Gilbert Frenn Photo

he'd worked 25 years without a sick day. "Do I miss it? Oh, yah," he said. "I'd be lying if I said no."



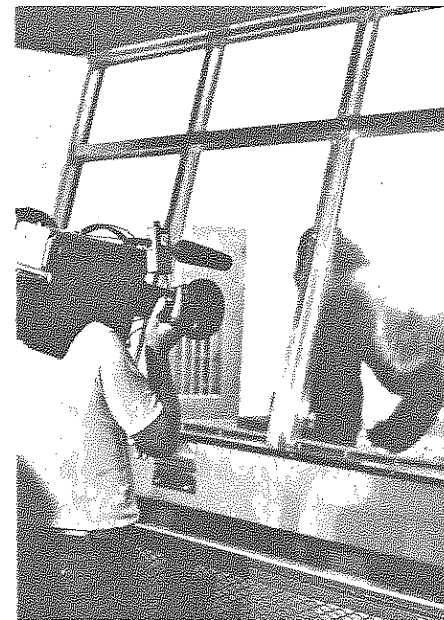
Tarantino

For Carlo Tarantino, zookeeper since 1957 and zoo laborer five years before that, it is time to relax and "miss the place that's been good to me and the group I worked with." He retired last month.

Observing zookeepers at work in Washington Park in the 50s, he decided to take the necessary steps to become one. When a keeper's position opened up, he took the exam along with 60 others — popular then as now — and got the job.

He was a regular in the primate house in Washington Park, and with the exception of a few years, has worked in the primate house here. "Which is where I wanted to be," he said. "I knew the people, knew the animals, and of course I got along with Samson because I'm short." (Short?) "Yeah, he doesn't like tall keepers. I don't know. He just doesn't."

"I'm going to miss it all."



Ray Fickett Photo

Male dominance via robust behavior was displayed twice by gorilla Tanga during his first meeting here with Diane, on breeding loan from Los Angeles. It occurred September 11, covered by all local media. The plucky Diane, half the size of her intended, made the first move. (She is experienced, the mother of three; he, a bachelor till now.) Healthy progression has been made so far, nothing dramatic, but they're keeping company around the clock.

QUARTERLY Animal Report

1.0.0 Male 0.1.0 Female 0.0.1 Sex Unknown

DONATED

0.0.2 Black Shark Fish
0.0.2 Sucker Catfish
0.0.1 Red Piranha Fish

BOUGHT

1.1 North American Otter
0.0.24 Wild Angelfish
0.0.1 Red Cardinal Big-Eye Fish
0.0.2 Archer Fish
0.0.4 Yellow-Tail Damsel Fish
0.0.3 Ocellaris Clown Fish
0.0.1 Rusty Angel Fish
0.0.1 Bicolor Angel Fish
0.0.25 Australian Glass Fish
0.0.4 Shubunkin Fish
0.0.3 Celebes Rainbow Fish
0.0.6 Land Hermit Crabs
0.0.12 Tetra Von Rio Fish
0.0.20 Celebes Rainbows
0.0.20 Blind Cave Fish
0.0.6 Black Sailfin Mollie Fish
0.0.6 Glass Catfish
1.0 South American Tapir
1.0 Thompson's Gazelle
1.1 Acouchi
0.1 Titi Monkey
0.1 South American Porcupine
1.1 Mandrill
0.1 Reindeer
0.0.2 California King Snakes
0.0.5 Spotted Turtles
0.0.1 American Alligator
0.0.7 Corn Snakes
0.0.1 Eastern Indigo
0.0.4 Chuckawallas
0.0.3 Alligator Lizards
0.0.2 Rosy Boas
0.0.1 Gila Monster
0.0.5 Florida King Snakes
0.0.2 Haitian Boas
0.0.1 Black Trigger Fish
0.0.1 Golden Stripe Grouper
0.0.2 Cardinal Fish
0.0.3 Seahorses
0.0.10 Damsel Fish
0.0.3 Percula Clown Fish
1.1 Hammerhead

BORN/HATCHED

1.0 South American Tapir
1.0 Kudu
0.0.1 Fruit Bat
1.0 Snow Leopard
0.0.1 Geoffroy Marmoset
0.1 Bongo
0.0.1 Mangrove Snake

BREEDING LOAN IN

0.0.1 King Vulture
0.1 Lowland Gorilla
1.0 Mandrill
1.1 Slow Loris
1.0 Lessor Galago
1.0 Cotton-top Marmoset
1.1 Tree Shrew

BREEDING LOAN OUT

1.2 Dall Sheep
0.1 South American Porcupine
0.1 Orangutan

SOLD

1.3 Reticulated Giraffe
0.0.3 Red Piranha Fish
0.0.2 Tin-Foil Barb
0.0.3 Red Oscar Fish
0.0.2 Jack Dempsey Fish

DIED

0.2 Caribou — Lung Worms
1.0 Woolly Monkey — Heart
0.1 Reindeer — Hardware Disease
1.0 Mule Deer — Enteritis, Shock
0.1 Eland — Lung Cancer
1.0 Mule Deer — Blood Poisoning
0.1 Dall Sheep — Lung Abscesses
0.1 Canada Otter — Complications of Old Age
0.1 Slow Loris — Pneumonia
1.0 Mule Deer Fawn — Acute Intestinal Inflammation

AT THE ZOO

November 1 Favorite Animals Announced. Results of election by school children.

November 1-21 School Tours. Guided 90-minute tours for kindergarten through high school classes, Tuesday through Saturday. Zoo admission and free parking for all Milwaukee County school groups — public and private — during regular school hours. Other school groups: \$1.75 adults, 75 cents children, \$6 per bus. Call Zoo Education Department to register.

November 1-30 Animal Athletes. Family program, self-guided. Pick up sheets at Zoo office.

November 7 Zoo Photography Workshop.

November 9 Ornament Days Registration Begins.

November 13 Orientation for Docents.

November 14 Milwaukee Public School Teacher Seminar. All day.

November 17-20 Turkey Days. School group activities, mornings, for kindergarten through Grade 3. Meet a live turkey, make a turkey to take home. Space limited. Registration underway.

November 21 Zoo Photography Workshop.

November 26 Thanksgiving. Zoo open 9-4:30.

December 1 Cross Country Skiing. Trails open daily, weather permitting. Equipment rental weekends. **Ice Skating.** Bring your own skates.

December 1-20 Samson's Tree. Bring an ornament from home to decorate tree in the Primate House.

December 1-30 Animals of the Bible. Family program, self-guided. Pick up excursion sheets in Zoo office.

December 12 Christmas Caroling. Family activity 10-1, caroling with Santa throughout the Zoo. Watch Samson, Diane and Tanga unwrap presents. Then make animal ornaments.

December 15-17 Ornament Days. School activity for Grades 3-5. Short tour of Zoo followed by making an ornament to take home. Limited registration starts November 9.

December 25 Christmas. Zoo open 9-4:30.

January 1 New Year's Day. Zoo closed.

January 2 Poster Contest Begins. Children 9-11 eligible to compete, to illustrate "Our Zoo in Winter." Contact Zoo Education Department.

January 9 Zoo Photography Workshop. For Society members only. Docent Training.

January 14 Docent Training.

January 16 Advanced Volunteer Training.

January 17 Zoo Photography Workshop. For Society members only.

January 19 Winter Tours Start. (Described November 1-21.)

January 19-27 Discovery Center presents winter program.

January 20 Poster Contest Winners notified.

January 23 Advanced Volunteer Training.

January 25 Poster Exhibit mounted.

January 30 Advanced Volunteer Training.

February 6 Advanced Volunteer Training, Mammal Workshop: Zoo in the morning, Wehr Nature Center afternoon. Limited registration. Call Zoo Education Department.

February 9-12 Bring a Valentine. Get a Valentine. School group program for kindergarten through Grade 2.

February 13 Valentine's Day. Family activity 10-1. Parents and children 3-12 years old bring valentines for favorite animals. Children receive coloring sheet at each house. Puppet show follows. Advanced Volunteer Training.

February 23-26 Arts and Crafts Days. School group program for Grades 3-6. Animal visit followed by craft session.

February 27 Advance Volunteer Training.

ALIVE Carol Moore Waite, Editor. Published quarterly by the Zoological Society of Milwaukee County, 10001 West Bluemound Road, Milwaukee Wisconsin 53226.