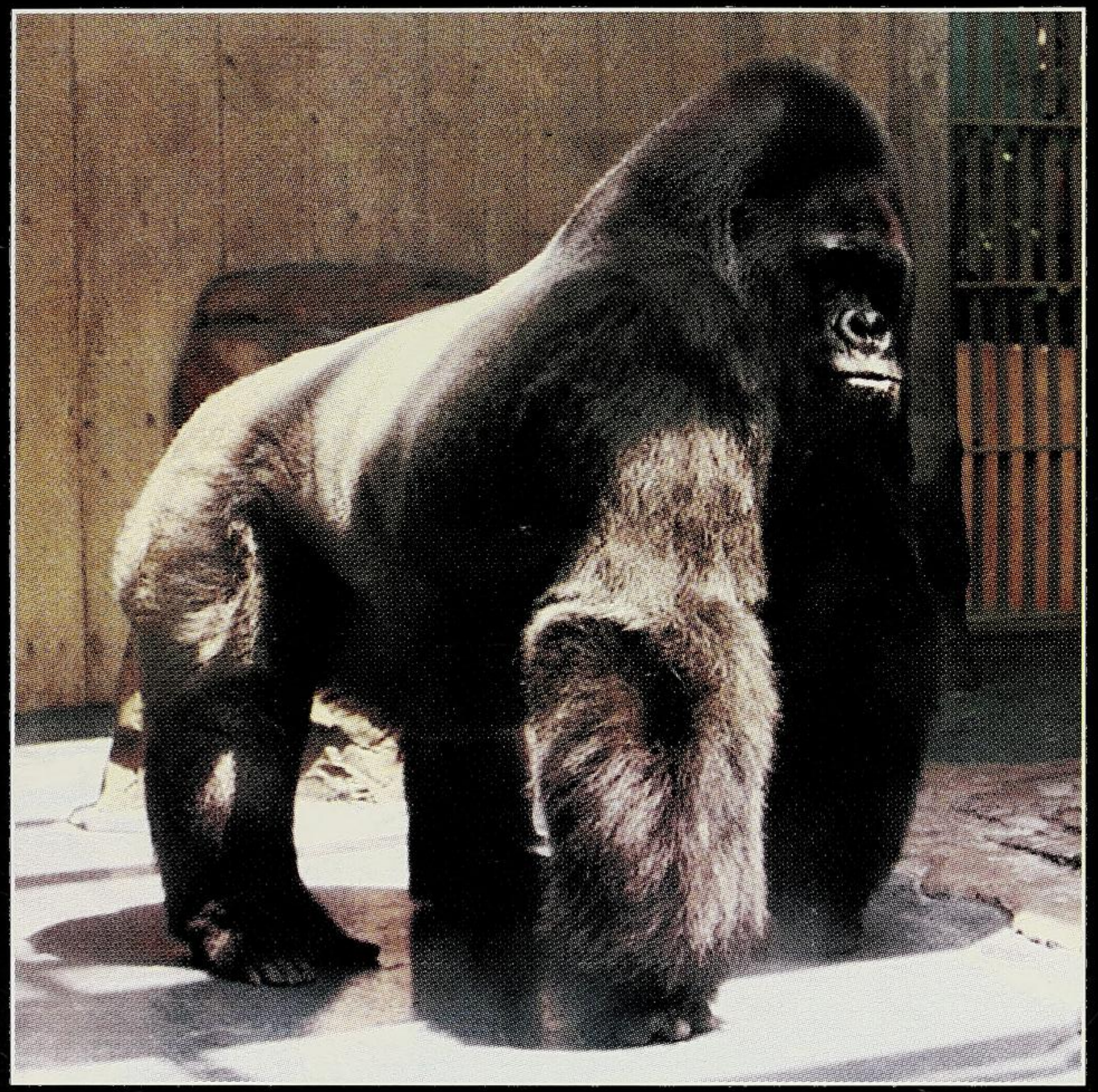
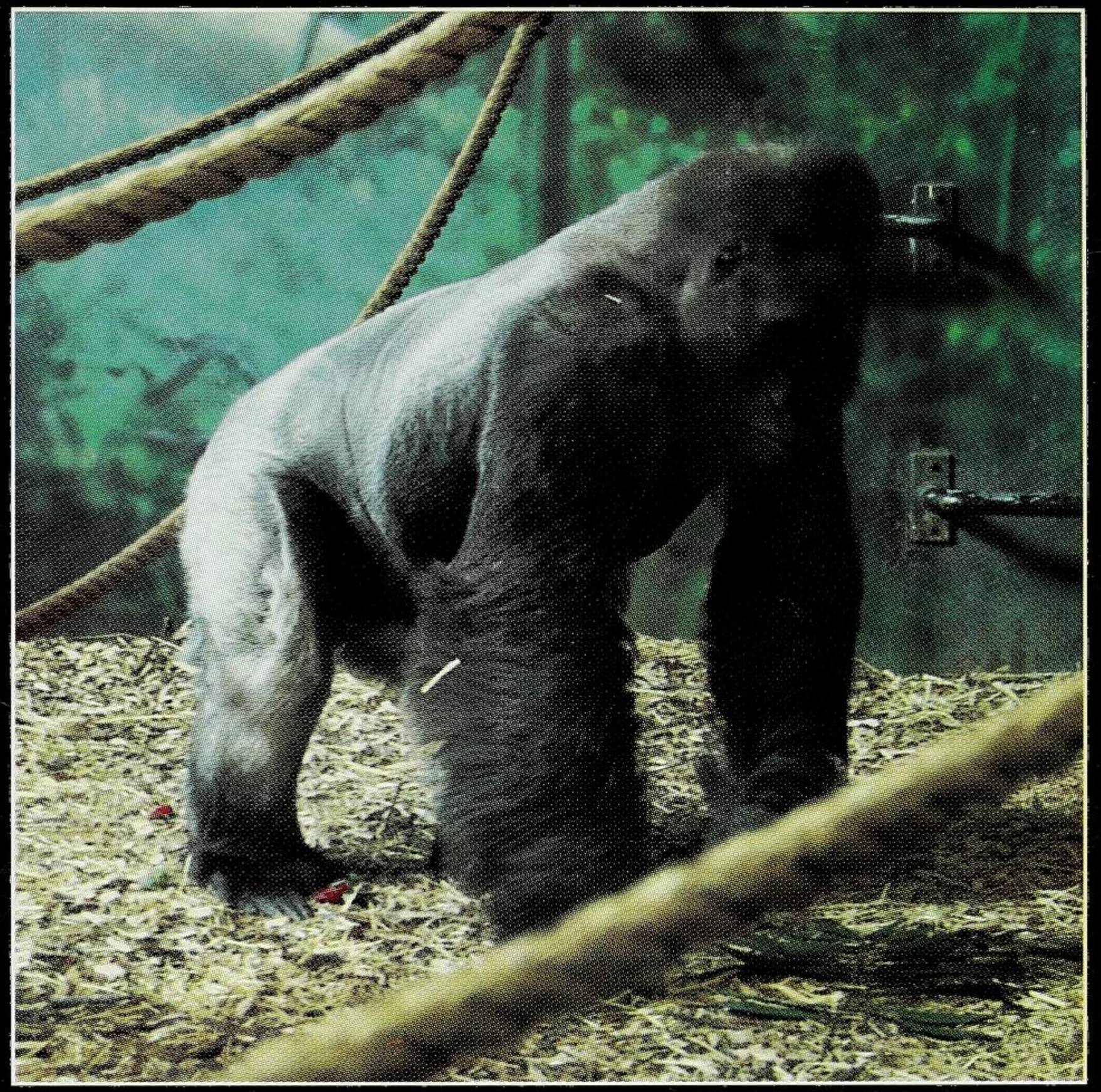
ANIMAL KEEPERS' FORUM

Special Dedicated Issue on the Care and Management of Geriatric Animals in Zoos





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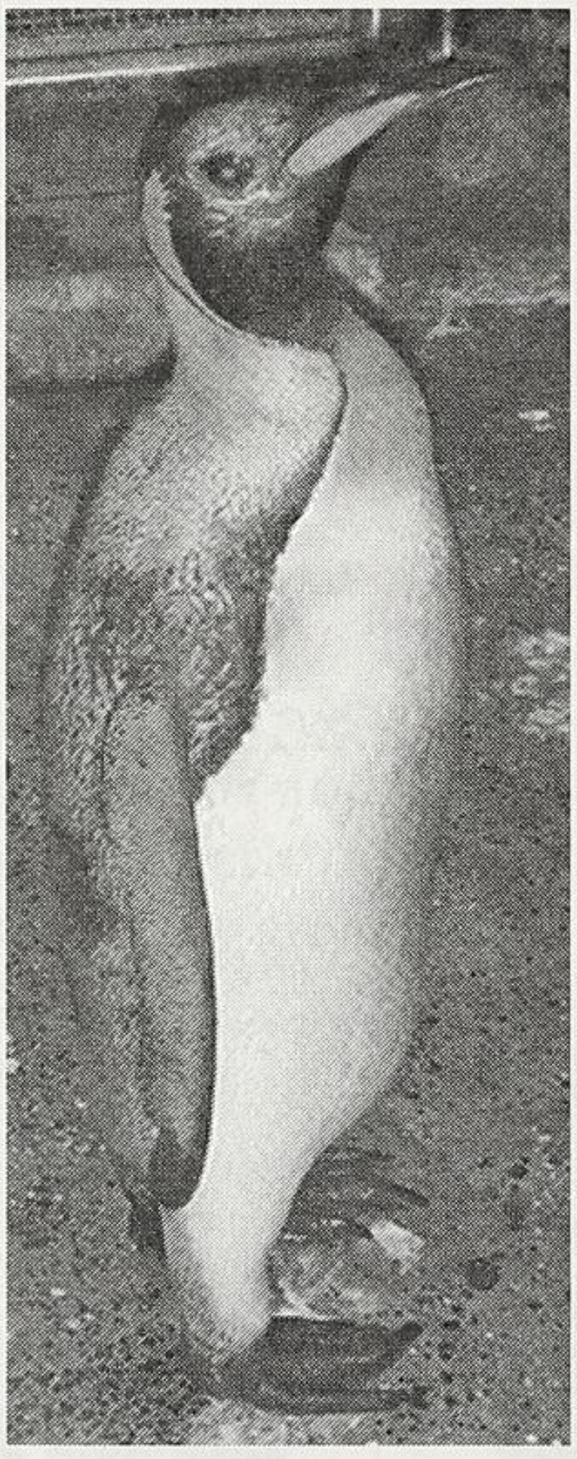
The Oldest of the Old

By Lindsay Cosens, Zookeeper – Birds; Marilynn Crowley, Enrichment and Research Technician - Mammals; Rebecca Johnson, Associate Curator of Amphibians; Mary Wulff, Enrichment and Research Technician – Mammals: Detroit Zoological Society, Royal Oak, Michigan

When the *Animal Keepers' Forum* put forth a call for papers to be featured in an issue dedicated to the concerns of caring for geriatric specimens, many of the keepers at the Detroit Zoo began mulling over what seemed to be an endless array of options to submit for publication. Like most zoological institutions as of late, the Detroit Zoo is home to an ever-increasing number of aging residents. We decided that it would be a good plan to condense and compile some of the issues and concerns that are part of everyday life here in Detroit and put forth a collaborative effort. We requested a listing from the zoo's registrar so that we could have some official documentation of the lifespans and histories of some of the oldest animals here. We had hoped to pin down a good variety of individuals so that a broad spectrum of issues could be addressed. But we got much more than we bargained for, and very quickly had to turn an about-face to try and put some limitations on the scope of this article.

The Registrar's list included birds, amphibians, reptiles and mammals. It included animals still living and those recently deceased. It included a great number of animals that have or had lived many years beyond average life expectancy. And it was by no means an exhaustive list. It turns out that in Detroit, we even have geriatric tortises. We quickly realized that the only way to seriously limit our scope would be to focus on a few very remarkable individuals representing an elite group of the oldest of their kind.



King 1 ("Mr. Man"), 2009
(Photo by Lindsey Cosens)

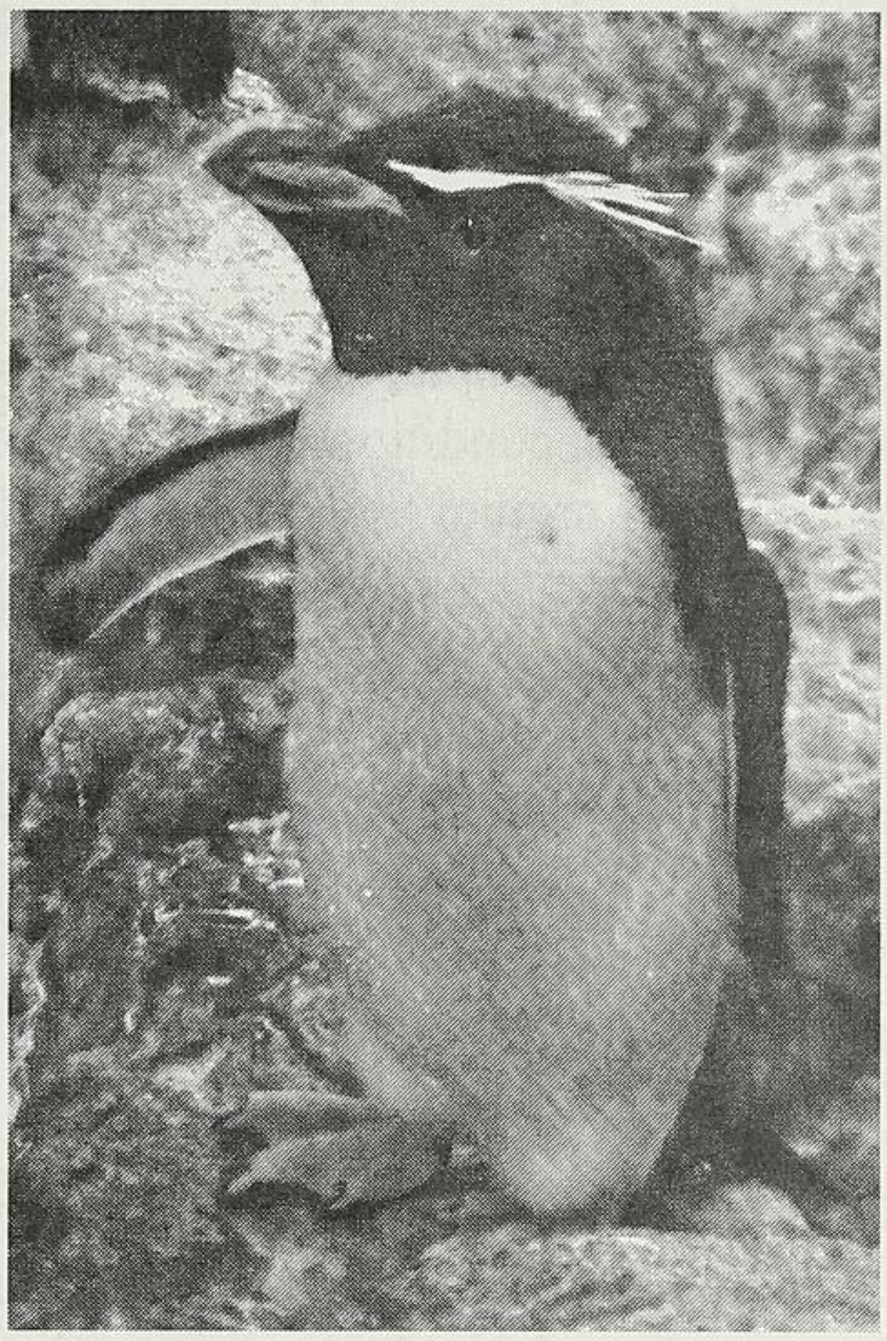
Penguins

Opened in 1968, the Penguinarium at the Detroit Zoo was the first exhibit in North America designed specifically to house penguins. The facility currently houses two of the country's oldest living penguins. King One [*Aptenodytes patagonicus*], also known as "Mr. Man," is over 41 years old. Collected from the wild as an adult, he has been at the Penguinarium since the building opened. Age has brought him cataracts, a slow walk, and poor preening skills. Although he avoids the pool, King One still pairs up for breeding season and provides fertile eggs. The other notable penguin is a 37-year-old Rockhopper [*Eudyptes chrysocome*] toting a yellow left ankle band, referred to as R-L Yellow. Born at the Detroit Zoo in 1972, this female was the first Rockhopper to successfully hatch in captivity. She, too, has cataracts and an awkward gait.

Of the 66 penguins at the Detroit Zoo, 36 individuals are aged 20 years or older. With an average lifespan of 15 to 20 years, this is a significantly geriatric population. The most common ailments occurring in the flock are arthritis, cataracts and pododermatitis (bumblefoot). With the assistance of the veterinary staff, effective treatments have been developed to manage these problems. Annual physical exams are performed to track the progress of each penguin's health. Changes in foot and body condition are noted and the necessary medical treatments are determined.

To manage arthritic penguins in the flock, a daily supplement of Glyco-Flex® (Glucosamine) is prescribed when a bird has developed an obvious change in its gait and/or exhibits deteriorated mobility. A physical

examination and radiographs are often performed to rule out any possible other underlying causes for limping, such as broken bones or fractures. Pain medications, such as Meloxicam, are also periodically prescribed to ease any discomfort caused by bouts of severe arthritis.



RL Yellow, 2009
(Photo by Lindsey Cosens)

Cataracts also frequently develop in captive penguins, causing impaired vision and eventually changes in behavior. Severe cataracts tend to impede the effectiveness of the indoor exhibit's light cycle, and can ultimately affect important behaviors such as molting. Not much can be done to prevent the development of cataracts. Severe cases are noted when a penguin is examined during its annual physical, and those individuals are placed on a list to checked monthly by a visiting ophthalmologist. Uveitis and irritation caused by cataracts are managed through the daily use of medicated eye drops when needed. In 2006, a visiting ophthalmologist suggested cataract removal for four of the Penguinarium's current residents. Two Macaronis [*Eudytes chrysolophus*] and two Rockhoppers made their way to the specialist's off-site facility. Each underwent a single cataract removal to help improve its vision. The procedure appears to have worked for these individuals, but due to its risk and potential complications, future surgeries of this kind are not likely.

Penguins of advanced age, along with many other species of birds, also commonly suffer from foot problems. Several environmental factors such as decreased activity and prolonged standing on hard surfaces may lead to pododermatitis or bumblefoot, which is a bacterial infection resulting in the formation of a lesion on the bottom of the foot. This disease creates damage to the tissue, potentially resulting in secondary bacterial infections. Swelling of the soft tissue and scab formation may cause discomfort to the individual, which further prohibits mobility. Several treatments have been utilized in Detroit's flock. Daily foot care includes thorough cleaning of the lesion with a Nolvasan® solution and application of a cream, such as Protecta-pad®. This helps avert the entry of additional bacteria by softening the tissue and preventing a core (a tissue "plug" in the center of the lesion) from falling out. In one severe case, a 24-year-old Macaroni female has also undergone surgical debridement, bandaging of the area, and has even worn booties made from wet suit material and Velcro® to help cushion her step.

Advances in veterinary medicine have made significant contributions to the husbandry of penguins. Good teamwork between the animal care personnel and veterinary staff at the Detroit Zoo has provided long, healthy lives for many of the penguins at the institution. King One and R-LYellow are living proof of these accomplishments.

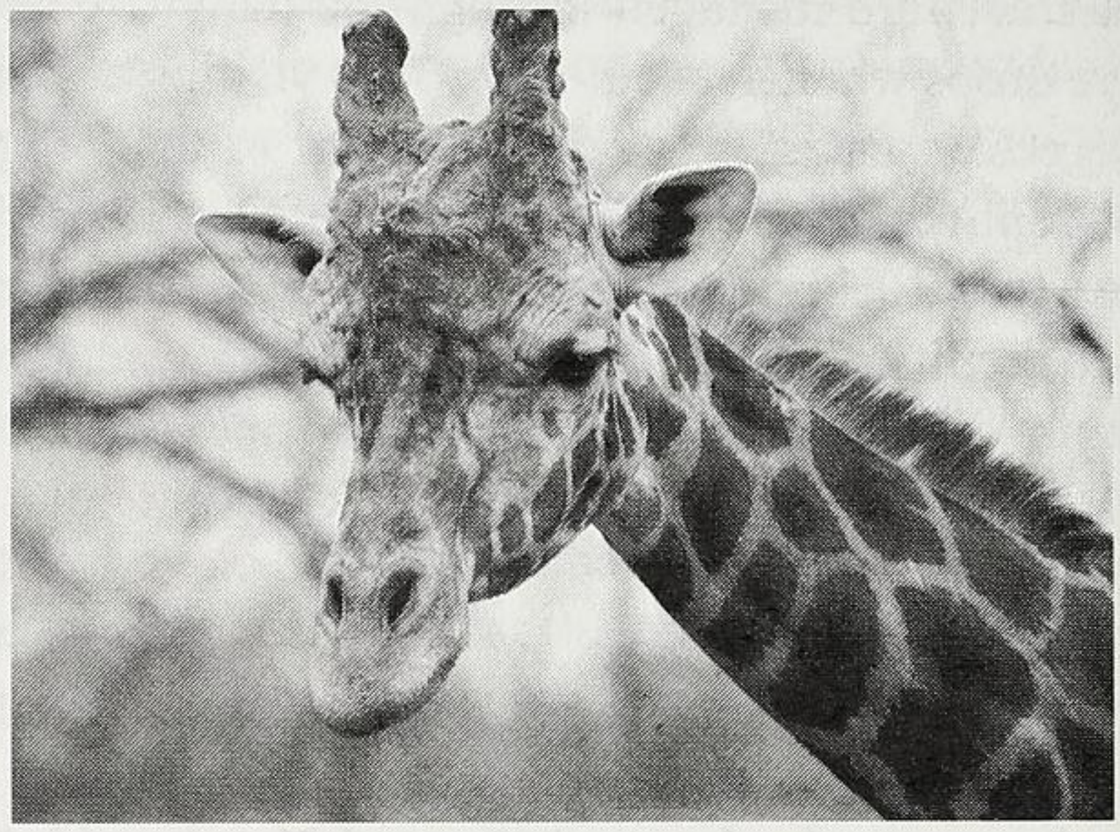
Ajax

At 26 years old, Ajax is the oldest male giraffe in North America. He has poor conformation and chronic arthritis. Ajax's advancing age exacerbates an already timid personality and Ajax has undergone extensive desensitization therapy to ensure the delivery of daily medications. Ajax is treated daily with Cosequin[Æ] and with closely monitored and continually adjusted doses of Tramadol and Phenylbutazone to alleviate pain and inflammation. Unfortunately, these treatments have the undesirable effect of making Ajax more mellow and less active, so it has also become very important to get him moving in order to keep his joints flexible. We use daily enrichment and training sessions to encourage Ajax to move and utilize all the available space in his enclosure.

Climate conditions in Michigan mean that Ajax spends the duration of the winter months indoors. Throughout the winter season, his keepers schedule daily target training sessions to get Ajax walking around. One-inch thick black rubber mats have also been added to the holding area floor to reduce the pressure on his joints. These seem to help as, given the option, Ajax usually chooses to stand on the mats. Specific placement of enrichment and food items also allows staff to encourage a natural stance. For example, alfalfa is fed from a hanging basket and pellet food is presented in raised food dishes. When conditions allow for access to the outdoor yard, Ajax's keepers hang various types of enrichment around the exhibit at different times during the day in combination with training and physical therapy sessions to encourage as much movement as possible.

The Detroit Zoo recently acquired a young male, one-year-old Jabari, and we have spent the last several months introducing him to Ajax and the other giraffes in the exhibit. Adding Jabari to the mix has also been great for Ajax. The daily interaction between these two males initiates a lot of movement from Ajax and increases species-specific interactions. Since the addition of Jabari to the group, staff has even witnessed Ajax bring himself to a gallop, something that does not occur very often.

Photo and video documentation have aided keepers and veterinary staff in documenting the progression of Ajax's condition. Since we can't observe Ajax 24 hours each day, video cameras were recently installed in his exhibit to monitor his movement. These cameras are integrated to a web site so that round the clock observation is now possible. A video record is created which can be reviewed at staff's convenience. Keeping a daily journal and detailed documentation of Ajax's behavior is critical to daily husbandry care and management of our elderly treasure and the close monitoring and evaluation of Ajax's quality of life.

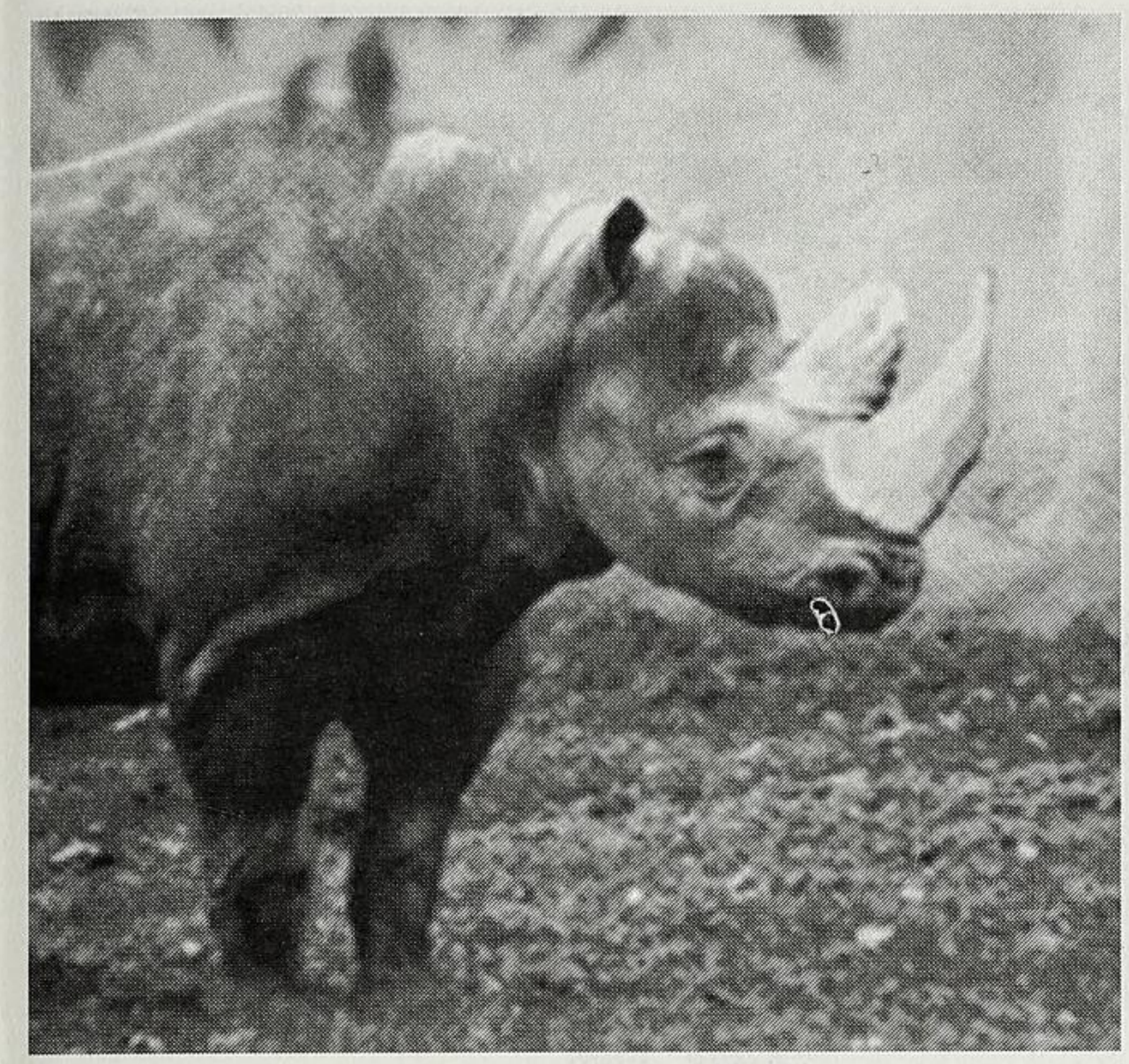


Ajax, 2006
(Photo by Tom Roy)

Rudy [*Diceros bicornis*]
Rudy, our black rhinoceros was wild-caught in 1952. We lost him December of 2001, making him the oldest known rhino in captivity. Rudy enjoyed good health throughout his adult life, but nevertheless we dealt with a number of age-related issues. Pressure sores on his hips, from increasing periods of time spent lying down were an ongoing concern. Black rhinos are prone to pressure sores due to poor circulation as they age. These were treated topically and systemically with silver sulfadiazine and Uniprim[Æ] to prevent infection and with fly repellent in the summer months to prevent infestation. A and D Ointment[Æ] was also applied in winter months to prevent further cracking or chafing. Rudy was trained to stand and lean-in at a protective contact barrier for these treatments. These interactive sessions also had the added benefit of keeping Rudy engaged, enriched, and active.

Always slim, keeping weight on him as he aged also became a problem. Sweet feed was added to his normal diet of monogastric pellets (horse feed) but that was met with limited success. So, we switched his base diet to a specially formulated Senior Equine pellet. He took readily to this new feed as it was easy for him to chew and he soon returned to a healthy body condition.

As with the majority of geriatric creatures, arthritis became our biggest challenge with Rudy. We dealt with this on a daily basis and attacked on every front. A hot water heater was installed in his holding area and he enjoyed warm, sudsy showers. Special mats were ordered for his bed, which resembled air mattresses but were filled with shredded rubber rather than air. These were layered with additional standard black mats to cushion the concrete floor. Occasional treatment with



Rudy, 2001
(Photo by Tom Roy)

phenylbutazone developed into an everyday addition to his routine with the dosage adjusted according to his needs. Panera® raisin bread was the key component to ensuring his cooperation with the medication process.

The most important factor in maintaining Rudy's level of comfort was the overwhelming affection his keepers felt for him. Anyone involved in the care and management of an older animal understands the special bond that develops. No treatment, be it topical, oral, medical or therapeutic can be administered with any success to an animal of Rudy's size without the benefit of a trusting bond. Rudy remained engaged and active until the end. He was a zoo favorite and we miss him still.

Adak [*Ursus maritimus*]

Adak was our 29-year-old, neutered male polar bear. Adak was captive born in Portland, Oregon and moved to Detroit via the Sacramento Zoo in March of 2000. Aside from some apparent stiffness on the dreariest of days, Adak, like Rudy, remained amazingly healthy until very near the end of his life. Adak received a daily supplement of Cosequin® to assist with joint fluidity, but otherwise required very little special attention.

Adak became a daily companion for our (then) three-year-old female Talini. Talini was born at the zoo and raised by her mother. But upon the re-introduction of her mother to a breeding male, she was strongly rejected by her mother post-breeding season and could not be re-integrated into a social group with any bear other than Adak.

One of the few age-related considerations that we made for Adak was whether or not to permit the continual assault from his always-ready-for-action companion. But Adak managed to deal with Talini quite well on his own, letting her know when he'd had enough, and we rarely actively separated them other than for routine feeding. Adak was an extremely easy-going male bear and readily accepted, even relished, his May-December relationship with Talini. We all truly believed that Talini actually played an important role in keeping Adak young. Just days before the heart wrenching decision was made to euthanize Adak, he and Talini spent a good hour and a half rough-housing in their pool. Still, there were occasionally days when Adak would decide he would rather just hang out in the air conditioning by himself and take a nap. And if that was what Adak decided, that is what we would have Adak do.

In the fall of 2007, Adak developed acute cardio-pulmonary edema indicative of congestive heart failure. He was immobilized, radiographed and given a cardiac ultrasound to confirm this diagnosis. His prognosis was grave. He underwent an aggressive treatment with diuretics and with the onset of cold, dry weather, improved almost miraculously. He spent the last two or three months of his life surprisingly active and in apparent good spirits. But in January 2008 we experienced an unseasonably warm spell for Michigan, and virtually overnight Adak's health took a catastrophic turn for the worse.

Adak's situation reminded us that the greatest defining factor in the life of a wild animal is its natural environment. That all our efforts to provide a close approximation to that environment can

turn against us in a flash, because in nature, it is most often that very factor that challenges and cuts short the lives of wild creatures.

Adak, 2006
(Photo by Betsie Meister)

In the end, Adak suffered—thankfully, only briefly. Understanding his cooperative nature and knowing his normal patterns of behavior provided us with instant warning that things were not going well. Adak's suddenly stubborn demeanor preceded the onset of obvious physical distress and made his pain terribly evident. A decision had to be faced quickly. Another round of aggressive treatment may have prolonged his life, may have even alleviated his symptoms for a period of time. But spring, thunderstorms and oppressive humidity are inevitable in Michigan. And it was obvious that no course of treatment would alleviate the imminent complications that would be brought on by such factors. We sadly made the decision not to risk prolonging his discomfort and said goodbye to Adak, the oldest male polar bear, in January of 2008.

Mississippi Gopher Frogs [*Rana capito sevosa*]

It is not that difficult to relate to the considerations of advanced aging faced by large mammals and charismatic birds such as penguins. But these considerations extend to all animals in our care. The Detroit Zoo is currently facing a unique situation regarding a small population of geriatric frogs. Mississippi gopher frogs are one of North America's most endangered amphibians. The Detroit Zoo received 37 wild-caught tadpoles collected from one of the last known wild populations in Mississippi in 2001. Since that time, the amphibian staff at the zoo's National Amphibian Conservation Center has spent years attempting to breed this frog in hopes of increasing the captive assurance population and discovering the methods needed for successful captive reproduction.

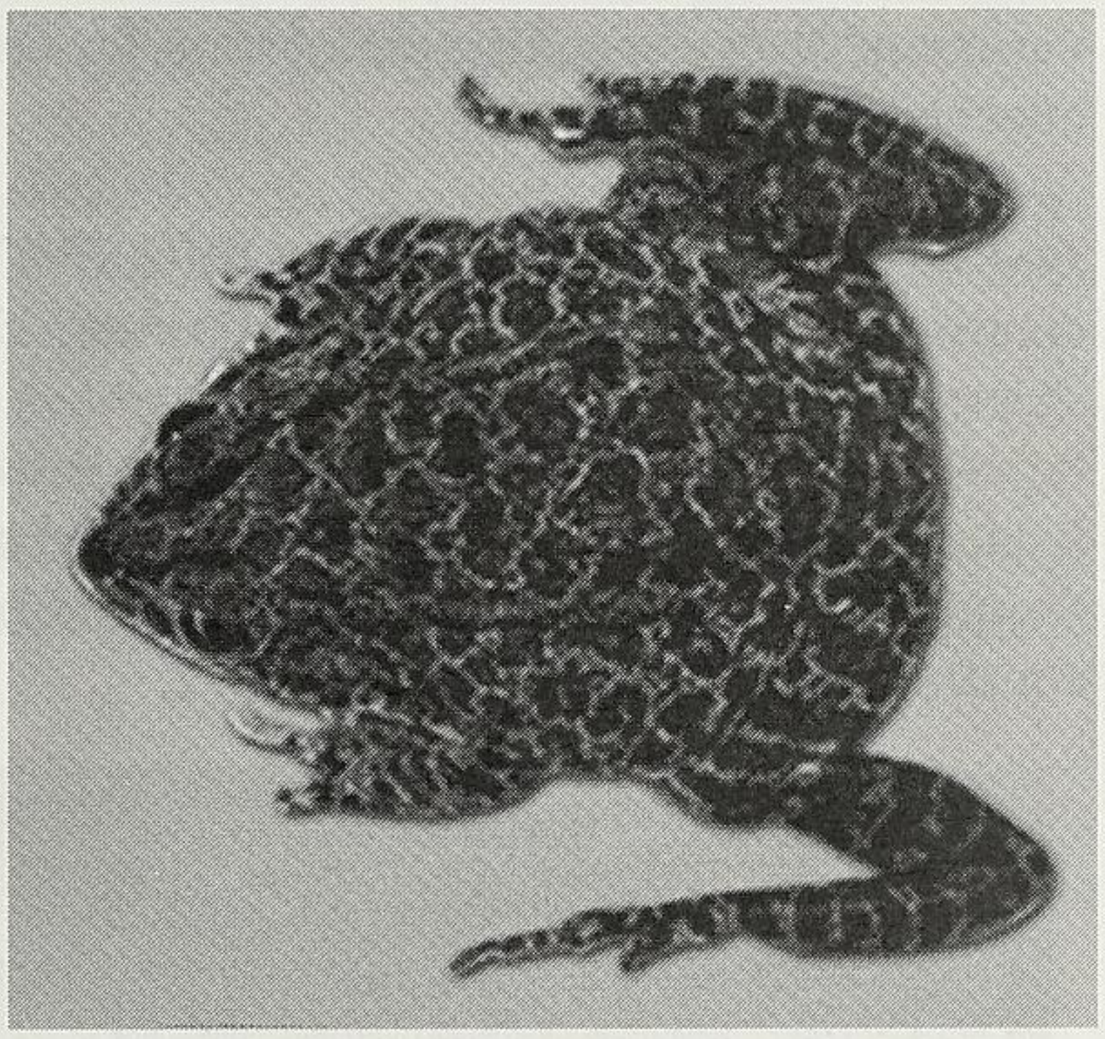
In 2008, with only four frogs remaining in our group, we came very close to success by first hibernating the frogs, then injecting them with a series of hormones along with playing audio recordings of wild male frogs calling for mates. Many eggs were laid by the female frogs, but they were unfortunately determined to be infertile.

As these frogs have reached or surpassed their normal life span, this year only two individuals remain alive in Detroit. These individuals are considered to be geriatric and have several medical issues. It is believed that neither frog is eating on its own any longer. Keeper staff must now "assist-feed" them both nearly every day. One has metabolic bone disease, a very painful disease in which the bones can be easily broken. She is now under a biweekly treatment of vitamins and calcium drops as well as exposure to more UVB light to help repair her bones. The other frog has a repeated issue with fluid retention. Due to kidney problems, fluids accumulate (usually in the animal's throat and thighs) and then must be aspirated by veterinary staff on a monthly basis. Besides these individual geriatric issues, captive Mississippi gopher frogs in general are under suspicion of carrying a newly discovered pathogen assumed to be contagious to all amphibians. Therefore, special measures are taken daily and our frogs are housed and treated as though they are in a permanent, indefinite quarantine.

The good news is that recent genetic tests have confirmed that our females are unrelated to male frogs at the Memphis Zoo, making them extremely valuable genetically to the captive population.

But due to their failing health, we did not attempt hibernation with our gopher frogs this year, which means there was also no egg production. And the repeated handling and relatively invasive nature of the procedures necessary to promote egg production have prompted many discussions about balancing the potential to cause physical discomfort to our frogs with the benefits of bolstering the captive population. Animal care staff in Detroit recently participated in some very serious quality of life discussions to evaluate this issue, the first ever at our institution to focus on an amphibian species. With the help of reproductive specialists from the Memphis Zoo, we've determined methods to minimize handling while stimulating egg production with a series of hormone injections, followed by manual expression of eggs from the female frogs. Sperm will be collected from the Memphis males and the eggs fertilized in a Petri dish. If successful, the tadpoles from this breeding will add to the Mississippi gopher frog captive population both in number and in genetic diversity and we will have a new generation and a few more years to work on perfecting methods of captive reproduction of the species.

Surely every zoological institution has had the honor of housing the oldest of its kind of some creature or other over the years. In discussing these amazing cases a set of conditions comes to mind. Whether it is genetics, environment, affection, trust, compassion, medical innovation or pure luck, no one can say. Likely it is a mystical combination of all of these that allows us to participate in the achievement of such milestone lifespans. Regardless of the cónditions at play, with them comes a daunting set of issues, not the least of which is "quality of life".



0.1 Mississippi Gopher Frog, 2008
(Photo by Dana Schock)

The Detroit Zoo firmly believes that maintaining an optimal quality of life with geriatric animals relies upon effective communication among the many people involved in providing that animal's care and having an active program and mechanism for sometimes difficult dialogue. When a flag is raised, we will call a meeting to actively evaluate the quality of life and make a decision that relies upon the input of all of those involved in the care of that animal. Sometimes the veterinary staff must simply make a judgment. But in most situations, probably 90% of the weight of that input comes from the keepers who are involved in the day-to-day care and observation of that animal. Subjectivity is always present because the perspectives are those of the humans closest to the animal and not of the animal itself. It is a serious responsibility to make decisions about the quality of life of the elderly creatures in our care. Just as our affection plays an invaluable role in elevating the quality of life of our charges, it is also possible for it to cloud our judgment or sway our thinking. We haven't the luxury of simply asking the animals how they feel. But if we are sharply tuned, and honest with ourselves, we can usually get it out of them.

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