Jack Hoopes: Adventures of a veterinary pathologist

By Roger P. Smith, Ph.D.

'But if I ran the zoo," / said young Gerald McGrew, / "I'd make a few changes, / That's just what I'd do . . ." was how Dr. Seuss described the feelings of an imaginary young friend in his 1950 classic, *If I Ran the Zoo*.

P. Jack Hoopes, D.V.M., Ph.D., may have had similar feelings in 1977, when he began an unusual two-year residency in exotic animal medicine and pathology at the National Zoological Park in Washington, D.C. Hoopes feels his training at the National Zoo—one of only a handful of the world's zoos with an intensive research program—played a key role in launching his academic career. Today, he's an associate professor of surgery (neurosurgery) and of medicine (radiation oncology) at DMS and the director of the Surgery, Radiation Oncology, and Bioengineering Research Laboratories at DHMC.

BOTH: JON GILBERT FOX

Jack Hoopes's DHMC domain includes this experimental operating room (above) and a laser lab (facing page).

Hoopes "is both the grease and the glue for a large number of collaborative research projects."

Back in Hoopes's zoo days, his research focused on the reproductive biology of rare and endangered species and on safely administering anesthesia to these animals. Using techniques such as cryopreservation of semen and in vitro fertilization—first tested in zoos, but now standard practices in animal husbandry as well as for human patients—he helped to perpetuate species as rare as the pygmy hippopotamus. But collecting sperm from animals, conducting other medical procedures on them, treating and diagnosing their illnesses, and recapturing ones that have escaped can be tricky and usually require that the animal first be anesthetized. Unfortunately, for many rare species there wasn't then—and still isn't—much good data on effective anesthetics and how to administer them.

Among Hoopes's many stories from his zoo days is one about the famous giant pandas—Ling-Ling and Hsing-Hsing—that were gifts to the United States from China in 1972. They were the zoo's most popular attraction for 20 years, until Ling-Ling died of old age in 1992, but their failure to produce offspring that survived more than a few days was one of the great disappointments of the international zoo community and of the National Zoo's regular visitors. Zoo officials finally decided that a gynecological and general physical examination of Ling-Ling, the female, might reveal the cause of the problem. Such an examination, however, would require anesthesia.

"Neither panda had ever been anesthetized before, and the literature contained almost nothing useful in the way of past experience," Hoopes explains. So he and his colleagues had to innovate. Ling-Ling was herded into a restraining cage. A syringe was attached to a pole that also served as the plunger, and then the syringe was loaded with what was, at the time, an experimental anesthetic. The drug was injected into Ling-Ling's hindquarters—the panda equivalent of the gluteus maximus.

"I was not the man in charge," says Hoopes, "but I certainly felt the pressure as much as anyone there. There was a certain chance of provoking an international incident if things did not go well."

Fortunately, the anesthesia and the subsequent procedures did come off smoothly, and the tests indicated that Ling-Ling was essentially normal. The problem seemed to lie with Hsing-Hsing, who was getting along in years.

Then there was the annual problem with the incontinent deer. At Christmastime, the zoo was responsible for one of the capital city's holiday traditions. A half-dozen "reindeer" (actually, Old World caribou) were transported to a special enclosure on the White House lawn for viewing by visiting dignitaries and the public. Every year, to the great discomfiture of both zoo and White House officials, the animals would without fail develop profuse diarrhea shortly after their relocation to 1600 Pennsylvania Avenue. The reindeer, of course, were under the continuing care of the zoo staff, and no expense was spared in trying to alleviate their symptoms and diagnose the problem. It took several years for a bacterial or parasitic agent to be ruled out. Some pundits wondered whether the animals were expressing a political opinion. But, according to Hoopes, the cause turned out to be rather mundane—the reindeer were suffering from an excess of exotic holiday treats provided by a well-intentioned but ill-informed public.

Hoopes also tells the story of a potentially dangerous situation that occurred while he was working at the zoo—when a keeper inadvertently left open the door to a bear cage. The large European bear wandered out, directly into the midst of a group of zoo-goers, who mistook it for a trained animal act. While the bear was kept interested in snacks provided by the spectators, the zoo staff swung into action.

"The authorities have contingency plans for animal escapes," says Hoopes. "The plans at the National Zoo include a list of species that

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are considered too dangerous to try to recapture with so-called tranquilizer darts." The problem again is one involving anesthesia, which even in humans can very occasionally trigger an unpredictable and dangerous excitation phase. It's the same phenomenon as when someone drinks too much alcohol—the alcohol suppresses inhibitory neurotransmission, so a person can become overly excited or aggressive before falling into a stupor or unconsciousness.

And in this case, there were too many people around for the zoo staff to risk using anesthesia, in case it temporarily enraged the bear. So armed zoo officials and a hastily summoned SWAT team began maneuvering slowly toward the escapee in the hope of getting an opportunity for a clean rifle shot, also very dangerous under the circumstances. In the meantime, the bear's chagrined keeper, trying to atone for his sin, had filled a bucket with fish, the bear's favorite meal. Feeding the animal one fish at a time, the keeper coaxed it toward the cage. Finally, he dumped the entire bucket in the enclosure, the bear went in after the fish, the door was slammed shut, and everyone breathed a sigh of relief.

Yet another apparent escape occurred during Hoopes's tenure at the zoo. One snowy evening, a security guard was convinced that he had seen a cheetah slipping under the main gate on Connecticut Avenue. "I had the bad fortune to live next door to the zoo," Hoopes recalls, "and therefore I was always among the first summoned to the scene in any emergency."

The cheetah cage near the gate was supposed to contain three cheetahs. Often, at night and in cooler weather, the animals would hide in a smaller interior enclosure—a hut-like structure with an entrance that was visible only from within the main cage. Now, no one was sure whether all three cheetahs were inside the hut. As key personnel were assembled, a pawprint was found in a patch of snow outside the gate. There was much speculation as to whether it was a cheetah's or a passing dog's. The police, armed to the teeth, were convinced it was a cheetah print, but the zoo staff were more skeptical. After two hours of debate, one brave staff member volunteered to venture inside the cheetah cage to look inside the hut and see if the big cats were all there. Cautiously, he shined a flashlight into the hut and counted three animals peacefully entwined, fast asleep.

While it is unlikely that Hoopes will ever again work with exotic species like these, he credits his experience at the National Zoo with interesting him in a research career. Moreover, a required rotation in the veterinary pathology laboratories there pointed him toward the areas in which he would specialize—pathology and radiation biology.

Before Hoopes's stint at the National Zoo, he attended Oklahoma University, earned his D.V.M. at Oklahoma State, and did an internship at a veterinary hospital in South Dakota. After his residency at the zoo, he went on to three more years of residency at Colorado State, while also earning a Ph.D. in pathology and radiation biology there. Then, after two additional years of postdoctoral training at North Carolina State and Duke, he came to DMS in 1988 as an assistant professor of medicine and of surgery and also as the acting director of the Animal Resource Center.

In his early years at DMS, Hoopes worked primarily on an NIH-funded project to determine the toxicity and efficacy of interstitial radiation and hyperthermia in the treatment of brain tumors. He has also collaborated on various other efforts, including mitigating radiation-induced heart damage by timing radiation to a specific part of the heart cycle; creating mathematical models for real-time prediction and assessment of brain movement during surgery; and studying the feasibility and efficacy of photodynamic therapy in the treatment of cancer and non-cancer diseases.

"Jack has developed a well-deserved reputation as a can-do person," says Richard Dow, M.D., chair of surgery. "He is both the grease and the glue for a large number of collaborative projects. Facilitators like Jack are often unsung, but are real heroes in the research environment."

Since 1992, Hoopes has also been the director of the radiation biology research program at DMS, as well as director of the irradiation shared service and codirector of the radiation bioengineering research program, both at DHMC's Norris Cotton Cancer Center (NCCC). Robert Greenberg, director of the NCCC, describes Hoopes as "an invaluable colleague for scientists working in cancer research."

His work in the pathogenesis and moderation of radiation injury in the brain, for example, may lead to a better understanding of the cascade of adverse events that follow radiation therapy, as well as help to determine whether higher curative doses of radiation can be safely delivered to tumors that are surrounded by normal tissue.

Hoopes was named director of the Surgery, Radiation Oncology, and Bioengineering Laboratories in 1996 and continues to keep tabs

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