

FEATURES



Adams shares a treat with a baboon, one of 450 primates that fall under his veterinary care at Hopkins.

By putting animals' welfare first, top vet Bob Adams has become a powerful ally to the scientific enterprise—and the “go-to” guy for researchers across the medical campus.

BY MAT EDELSON

PHOTOGRAPY BY KEITH WELLER

The CV is impressive, even by Hopkins' demanding standards. Co-authorship on 67 papers, touching on nearly every facet of biomedical research: *Journal of Infectious Diseases*, *Journal of Rheumatology*, *Science*, *Circulation*, *Neurotoxicology* ... to name but a few.

A quarter-century as director of a division intimately involved with many of the scientific advances at Hopkins:

Potential cures for paralysis. Discovering the pathways that lead to the neurological devastation of AIDS. Understanding the addictive properties of drugs. Then there's the surgical wizardry, testament to his colleagues' claims that he's a technical marvel whose knowledge of anatomy is without peer. All this, and the man does not possess an M.D. Nor, for that matter, a Ph.D. Or an Sc.D., M.P.H., or any other of the alphabet soup of advanced degrees so common to Hopkins researchers.

So who the heck is Bob Adams?

He's a veterinarian.

And his work is helping to change the face of human medicine.

Cardiac surgery fellow Lois U. Nwakanma, M.D., has hit a brick wall, and so she's turned to Robert J. Adams, D.V.M. (Doctor of Veterinary Medicine), this autumn afternoon for guidance. It's not the first time she's come to him for help. In the past, Adams has shown her better, less invasive ways to collect cerebrospinal fluid for animal studies. Today, Nwakanma is in the midst of testing an artificial lung designed to reduce pulmonary hypertension in humans. But first she must determine if the device can reduce pulmonary hypertension that's intentionally induced in a test animal. Therein lies Nwakanma's dilemma: Which animal to use? Dogs have a known response to drugs that induce hypertension, but they don't have a long enough pulmonary artery, the point at which the device attaches. Sheep have the right anatomy, but Nwakanma has discovered they don't respond as well—or at all—to conventional hypertensive drugs.

What she needs is options, so the duo is brainstorming at the small round table in Adams' office in Ross 459. Adams agrees that sheep are the right model. "They've been used for lung work for years," he says.

Adams asks if she's tried other ways of inducing pulmonary hypertension.

"We can create a fistula [an arterial malformation through surgery], which we don't want to," answers Nwakanma, thinking about the problem facing the sheep. What about using other metabolites to induce the hypertension, she asks.

"I've never done that," says Adams, and the room falls silent.

With someone else, that might be the polite end to the conversation. But not with "The Facilitator." Adams jumps up

and reaches for a maroon book. It's called *Experimental Surgery and Physiology: Induced Animal Models of Human Disease*. Its 350 pages list dozens of animal models for everything from skin regeneration to pancreatic transplants. He combs the tome, pages he once co-edited, looking for Nwakanma's solution. Flip. Flip-flip. Flop. Nothing. . . but then an idea pops out of Adams' comprehensive mental Rolodex.

"Have you talked to Wayne Mitzner?"

"Who?" asks Nwakanma.

"He's a pulmonary guy in public health. He's married to—what's her name at Bayview? She does sheep/lung work..." Adams' fingers start popping in the air, urging his Rolodex to rebuffer. *Snap! Snap!* It takes a few seconds to comply. "Wagner!" he suddenly says. *Snap!* "Elizabeth Wagner. You might want to talk to them to see if they have any ideas."

Nwakanma is thrilled to have a lead, and she continues to toss sheep question at Adams, who is most comfortable talking about non-human primates, a.k.a. monkeys. "I can't tell you exactly," he replies to one of her sheep queries. "In fact," he laughs. "I can't tell you at all. That's not really my field. My field is, 'Can I tell you anybody who might know?'" And then he smiles and answers his own question.

"Yeah, I can."

As Nwakanma departs, pleased to be potentially one step closer to jump-starting her research, Adams jokes that, after 30 years at Hopkins, he should know everyone.

From 1979 to 2004, Adams was director of Animal Services and Laboratory Animal Medicine in the Division of Comparative Medicine. Any researcher in all of Hopkins who wanted to conduct animal research first had to go through the Animal Care and Use Committee on which Adams sat. That he and the committee were rigorous before giving their approval wasn't a bureaucratic power play; with only a tiny staff (in his first years, just he and another veterinarian), it was Adams' and his team's responsibility to keep each animal healthy, a task he bluntly admits kept them logging plenty of miles around campus. Adams and the committee wanted—indeed demanded—a deep commitment to animal welfare from researchers; a sense, on paper and in action, that investigators understood why they needed the animals, could justify the experiments they had planned, and were cognizant of the procedures that they and their post-docs had to perform to keep the animals safe, secure, and pain-free in the lab setting.

"I ticked off plenty of people around here," says Adams, his way of indicating that those researchers who didn't pass the committee's muster never saw an animal.

Still, those who know him best say that beneath that gruff exterior beats a caring and collaborative heart—and a guy who chuckles when relating the unlikely genesis of his career path.

Turns out that in the 1950s, Ozzie and Harriet weren't nearly as influential on the youth of America as one huge insurance company. "In those days, New York Life had a whole bunch of career pamphlets called 'Why Be A ...' I sent away for one. I got a pamphlet called "Why Be A Veterinarian." From that day on," says Adams, "I wanted to be a veterinarian."

As a kid, the only animal under his care was the family's dime store parakeet. But that would soon change. To get into veterinary school in those days called for farm experience, so the boy from New York City went upstate to get up close and personal with the denizens of a dairy farm (and, yes, he proudly demonstrates the best technique for milking a cow: Think of a piano player sequentially loosening up his fingers by grabbing at the air and you get the idea).

Acceptance to Cornell's prestigious vet program followed, and after graduation in 1973 the 24-year-old headed west. "I used to watch American Bandstand on TV. One day they had Paul Revere and The Raiders playing on a California beach. Seemed like a nice place to live," says Adams.

Adams piled into a friend's Corvette, crossed the Rockies, and found himself in a Menlo Park veterinary practice. After a year of taking care of family pets, he knew something was missing. "I was unhappy, for whatever reason." Though his experience tending to different species was growing—he'd



> Adams with skeletal specimens from his collection. "I'm not here to hold up a 'stop' sign" to researchers, he says. "I'm here to hold up a 'slow' sign."

treated everything from dogs to kitties to even Boris the loris—Adams was seeking an outlet to match his curiosity. He recalled a lecture while at Cornell on an emerging new field: Laboratory Animal Medicine. Johns Hopkins, under Edward Melby, had established one of the few such post-doc Laboratory Animal Medicine programs in the country. Adams applied, was accepted, and headed back east.

The rest, as they say, is history. Except in this case Bob Adams got to write most of it.

“Hi fellas,” says Adams, dressed head to toe in blue scrubs. Immediately the fellas respond—in a cacophony of squeaks, screeches, and clicks. Quiet around people, Bob Adams is positively expansive around the small pigtail and rhesus macaque monkeys that are housed in Ross. His movements are sure, his patter steady and reassuring as he injects a seven-pound pigtail with ketamine, a quick acting chemical disassociative that makes the macaque safe to handle. Moments later the docile monkey is intubated and on its back on a surgical table. On its tawny chest is a thin blue tattoo, a number and a letter, an identification code.

Working with veterinarian technician Lani Swarthout, Adams grabs a bronchoscope. “I’m going to put the scope down into the lung, flush down sterile saline, then suck it back to get macrophages,” he explains. The cells will be useful for Hopkins researchers in their cellular studies.

As Adams proceeds, he invites a gowned and masked observer to peer into the scope, to better understand both the pigtail’s unique anatomy and how he’s trying to get the investigators their cells while limiting the animal’s potential distress from the scope. A substantial amount of saline has to be put into the animal because its lungs have tremendous absorptive capacity, meaning the fluid that can be retrieved in any one attempt is limited. Adams could put the scope in deeper to retrieve more liquid, but he’s reluctant to do that. “I don’t want to go in too far; if you look, you see the little bit of redness there?” The observer nods; There’s a small irritation that stands out against the pink, healthy tissue. “That’s because the scope is banging up against the bronchial wall. I try not to do that. I don’t want to get blood.”

When Adams is done, he packs the macrophage tubes in ice and hustles them down the hall to one of his research colleagues in what’s now known as the Department of

Molecular and Comparative Pathobiology, where Adams has an appointment as an associate professor.

The change from a division to a department that occurred in 2002 is no accident; it's reflective of just how much growth Bob Adams and his colleagues helped foment in his 33 years at Hopkins. The department today includes two areas Adams ran until recently; Research Animal Resources (RAR), responsible for the procurement and assignment of research animals, and Laboratory Animal Medicine, which covers the care of research animals and has morphed into a \$15 million dollar, 20 veterinarian division intimately involved with helping investigators conduct research. Among the menagerie RAR manages are 700 rabbits, 50 cats, 25 dogs, 450 primates, a handful of sheep, and 170,000 rodents.

That's a far cry from the old days. When Adams arrived on campus, RAR didn't even exist (it was called Animal Services back then) and laboratory animal medicine was part of the then small Division of Comparative Medicine. "[The] idea was that there's a synergy between human disease and animal disease," explains Adams. "By studying the animal you could learn about the human."

At many medical institutions at the time (and even today), comparative medicine was seen more as a service arm than an academic pursuit. At Hopkins, however, giving veterinary post-docs such as Adams academic appointments—he was appointed an assistant professor in the division in 1978—and putting them side-by-side as academic peers with researchers in the division began to give veterinarians the institution-wide respect they were due.

Adams' post-doc and fellowship contemporaries in the division have championed important research across the medical spectrum, most notably regarding HIV. Chris Zink, D.V.M., Ph.D., has spent more than 20 years studying the simian immunodeficiency virus (SIV), which is similar to HIV. Her pathology lab recently discovered an inexpensive antibiotic that suppresses reproduction of SIV/HIV in animals, as well as neurodegeneration and brain inflammation associated with the virus.

Joseph Mankowski, D.V.M., Ph.D., has long worked with neurology and cardiology faculty; his lab identified biomarkers that predict the onset of central nervous system disease arising from SIV/HIV. Janice Clements, Ph.D., director of the division's retrovirus lab and



first director of the Department of Molecular and Comparative Pathobiology, has developed animal models of AIDS-related dementia, and shown how SIV/HIV replicates differently in the central nervous system than it does in the blood. Julie Watson, M.A., Vet.M.B., Director of the Rodent Health Program, has devised unique methods for eliminating diseases—specifically the commonly spread Helicobacter bacteria—from contaminating the mouse and rat colonies. Her work is vital, given the number of genetically modified rodents researchers need.

What many of these researchers have in common—along with other Ph.D.'s outside the division—is the credit they give Bob Adams for the successes they've achieved. Sometimes the assistance was technical—like the time Chris Zink needed to biopsy a monkey's spleen, as that organ stores a lot of SIV virus. One problem: "The spleen is a very bloody organ; there's no way you could just take a piece off without the animal probably hemorrhaging to death," says Zink, interim chair of the Department of Molecular and Comparative Pathobiology. In stepped Adams, who designed a surgery using a small, sterile plastic cable tie that allowed a part of the spleen to be removed safely, without harm to the animal. "He has the knowledge of where all the blood vessels are, all the things to make it work," says Zink.

Janice Clements frequently relies on Adams' keen observational skills. "We're looking at animal models of AIDS and the effect of virus on the brain, and very often the early signs are very subtle. He observes the animals every day. Each one has a personality, a routine. When he sees a break from a lack of appetite, even their reaction to him, that's what he picks up on," says Clements.

Still, for all his research accomplishments, Adams remains in his head and heart a workingman's vet, more comfortable attending to animals than dealing with humans. If there's a legacy to be had, it will be in the rigor he's inculcated at Hopkins to ensure that laboratory animals receive proper treatment. The 79-page "blue book" he regularly updated—Use of Experimental Animals at Johns Hopkins University—is a comprehensive guide to every aspect of animal care and procurement, including correct handling of different species, analgesics and anesthetics to be used during surgical procedures, and a guide to safely handling animals.

That commitment to safety may be most evident in the colony of monkeys he's bred for the institution. Herpes-B is inherent in "old world" macaques, the type of monkeys often used in research. Herpes-B is potentially fatal in humans, and can be spread through contact with infected monkeys through bites, feces, or urine. The media attention given to the death of a veterinarian at Emory University's Yerkes National Primate Research Center from exposure to a Herpes-B



> Fun and games: Animal enrichment specialist Andy Glenn

infected monkey gave the public insight into the potential dangers involved. It took several decades, but by carefully testing and mating animals, Adams has been able to safely create a large colony of rhesus macaques that are predominantly Herpes-B negative, one of the few primate colonies in North America that can make that claim. A recent NIH grant now has Adams beginning to replicate those results with his pigtail macaque colony—which promises big advantages for researchers since pigtailed develop SIV far more quickly (80 days versus as long as two years) than their rhesus brethren.

With Christian Newcomer, V.M.D., now acting as Associate Provost for Animal Research and Resources, and with Laboratory Animal Medicine now administered elsewhere in the department, Adams, at 57, says he's happy. Finally, he says, "I don't have to manage anyone but myself." He's content to teach and preserve the service aspect of the four-year Laboratory Animal Medicine post-doc program, which over time has swung over to emphasize research. "The first year is funded by animal resources, so we can train the veterinarians like residents," Adams explains. (The department also has a shorter Laboratory Animal Medicine residency program for vets that is predominantly service-oriented.) "After that, they spend increasingly more time in the lab, doing research."

With only a few more years until he rides off into the sunset, Adams hopes that he's leaving behind for researchers a better understanding of the important role he and his veterinary colleagues play in the institution. "I'm not here to hold up a 'stop' sign to researchers who want to conduct animal experiments," says Adams, who remains on the Animal Care and Use Committee. "I'm here to hold up a 'slow' sign. Maybe 'Yield.' We have a police function, a regulatory function where we try to keep everybody out of trouble."

For the most part, Adams has done just that. And his reputation as being Hopkins' equivalent of the Shell Answer Man for animals has left him with, if nothing else, some memorable tales. Calls for peregrine falcons on buildings, sightings of a mink on campus ("A mink?" he laughs. "It was a rat!"), a zoo gorilla who grabbed Adams during an on-site procedure and threatened to turn him into a rag doll ("...all of a sudden this hand reached out and grabbed my ankle!")...yeah, the man has had a pretty colorful career. He's most proud of the dozens of post-docs he's trained to carry on his ideals and his commitment to animal care. Woody Allen once said that 80 percent of success is showing up, but when it comes to providing veterinary care, Bob Adams says that number falls about 20 percent short. "We go to where the animal is— Bayview, Homewood. That wasn't done in the real old days," says Adams. "I've heard stories of calves having to be wheeled across the street because the veterinarian wouldn't go to them. If I had any role, maybe I brought the program to where it was more credible, and people could rely on it."

Just like they've learned to rely on him. ★

Products of Their Environment

Andy Glenn has just finished his newest contraption: a gumball machine for marmosets.

Live mealworms, a marmoset delicacy, wriggle around on top. By pushing out with his hands, a marmoset can watch the worms as they slowly fall to the bottom. "Animals can spend up to 90 percent of their free time foraging," Glenn explains. "So I try to occupy their time and stimulate them so they appreciate the food reward."

While the marmosets enjoy their mealworm snack, Glenn notes proudly, they can sit back and watch the latest shows on their big screen TV, complete with surround sound.

Hopkins' resident animal enrichment expert, Andy Glenn is a unique hybrid; part Dr. Doolittle, part MacGyver. In between his rounds with the animals every Monday, Wednesday, and Friday, where he monitors, trains, and plays with the Hopkins menagerie, Glenn cloisters himself in his "workshop" to create new gadgets to enrich the animals' lives.

His mission: to ensure the psychological well-being for all of Hopkins' research animals. "I'm doing my best to remove the mentality that the animals are simply here for our benefit," says the 31-year-old. "This should be as symbiotic a relationship as possible."

The big-screen TV notwithstanding (it came as a donation), Glenn, with assistant Natalie Green, works within a modest budget. He makes use of simple and inexpensive items—PVC pipes, plastic boxes, nylon webbing—to make jungle gyms, ornate perches, obstacle courses and other items that help the animals maximize their time in the cages. And no cookie cutter shortcuts either; be it cat or catfish, Glenn customizes each item to match the client.

Glenn is eager to expand the reach of his enterprise. He is teaming up with the Baltimore Zoo to design enrichment toys for some of their animals (first on the agenda will be a raft for the penguins) and local shelters to help socialize research dogs to make them better adoption candidates once they finish their tenure.

The Towson University graduate has also gone back to his alma mater and started an internship program that allows students to do four-week rotations with him and get a hands-on introduction to animal care. The program benefits both the animals, which get exposure to more faces and thus are more comfortable around people, and humans, who get exposure to a still-overlooked facet of medical institutions. "Young people interested in working with animals only think about glamorous jobs like park ranger or dolphin trainer," he says. "Research animals need help too." —Nick Zagorski