

# Memorial Eulogy for Dr. Richard M. Hays

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It's an honor for me to speak today about Dr. Hays and his career at Albert Einstein College of Medicine.

Dick attended college at Harvard and medical school at Columbia University. He then took further training in kidney research at Harvard's teaching hospitals, before joining the Einstein faculty in 1960.

At Einstein, Dick was a scientist, physician, and teacher. He was also known for having a good sense of humor, an infectious chuckle, and a commitment to excellence.

As to his science, the big picture is that he was a naturalist in the tradition of Charles Darwin, by which I mean he was a keen observer of nature and species and organisms.

This began early. As an undergraduate, he majored in anthropology, the science of humanity. Thus, the first species he observed as a naturalist was his fellow human beings, *Homo sapiens*.

The first species Dick studied *experimentally* was the harbor seal, *Phoca vitulina*. This occurred because, while still a medical student, Dick was invited one summer to the Mount Desert Island Biological Laboratory, in Salisbury Cove, Maine, to work on what is called the "diving reflex" in the seal.

It's fitting that Dick's first exposure to research took place at Mount Desert, a famous and important research lab, because he later became its lab director and was a lifelong ardent supporter.

His writing about that first summer research experience gives you a feeling for the man:

"So, up we went: Stan Bradley, Paul Marks, Willoughby Latham and others, to study the diving reflex. I couldn't wait to assist in the experiment. On the appointed day the seal was wheeled into our lab on a cart. He was one angry subject, and Stan warned me to stay away from his mouth, which had teeth as sharp as a dog's. At one point in the experiment a funnel would be clamped over the seal's nose to simulate a dive. I was given a bucket, and stationed at the distal end of the seal. Ever inquisitive, I asked what the bucket was for, and Stan said: "you'll see". The experiment began, and soon enough the funnel was placed over the seal's nose. Voila, the dive had begun! And soon enough, my role became clear, as a massive diarrheal stream emerged from the seal. I deftly caught it in the bucket, and my scientific career had begun."

Like any good naturalist, Dick studied many different spe-

cies, including the tadpole of the green toad, *Bufo viridis*, the mud shark, *Squalus acanthius*, and the winter flounder, *Pseudopleuronectes americanus*.

Dick also knew more than you'd think he would about another species, *Periplaneta americana*, the North American cockroach. Ceci Haas told me that, years ago, she had a strong reaction to her roach-infested office at Einstein, whereupon Dick gave her a book entitled "Archie and Mehitabel". For those of you too young to remember - and this includes me - for many years there was a daily cartoon in the New York Sun featuring a fictional cockroach and alley cat named Archie and Mehitabel. Archie the cockroach typed by jumping from key to key on the typewriter. I can just see the smile on Dick's face as he gave Ceci this treatise on her office cohabitants (I'm happy to report that we no longer have roaches at Einstein).

Dick also knew the laboratory mouse, *Mus musculus*. One morning at Einstein, a renal fellow presented a research paper about a mouse that had been genetically manipulated by scientists to live twice as long as normal. The researchers had dubbed their creation the "Methuselah Mouse". Dick leaned over to me at this point and did a pitch-perfect adaptation of a song from Porgy & Bess:

"But who calls dat livin'  
when no gal'll give in,  
to no mouse what's 900 years."

But the species Dick studied most was the cane toad, *Bufo marinus*. This toad is native to central and South America, will eat about anything, dead or alive, and is very large; the largest to date weighed 6 pounds and had a 15 inch body length, not counting the legs.

Now, you are probably asking yourself, why on earth would a Harvard-trained physician do experiments on a giant Latino toad? More importantly, why would is this guy telling you about it at Dick's memorial service?

Well, throughout his career, Dick was always trying to figure out how the kidney works. Specifically, every day the kidney generates the equivalent of a 55 gallon drum's worth of what one might call "preliminary urine", almost all of which is, in turn, reabsorbed back into the body, so that we end up excreting only a couple of quarts as final urine.

Now, the kidney is extremely complex and hard to study experimentally, especially with the techniques available to Dick at the time. To make progress on a tough question like this, you need what is called a "model system", that is, a simpler version of the complex thing. But what model

system could there be that would mimic the reabsorption of fluid by the human kidney?

The toad urinary bladder. The toad lives near water, but when the dry season comes, it buries down into the mud. The mud then dries out, but the toad does not, because it has stored water in its urinary bladder and reabsorbs it as needed during the dry spell.

Dick and his mentor, Alex Leaf, cleverly reasoned that the cellular machinery used by the toad to reabsorb water from its bladder might be similar to that used by the human kidney to reabsorb much of what I'm calling here "preliminary urine".

In a landmark paper, they showed that a hormone called vasopressin, which is the same hormone in man and toad, stimulates this water reabsorption by the toad bladder. This was a crucial finding in kidney research; we now know a tremendous amount about the kidney, and the part about vasopressin and water reabsorption is very, very important, and it all builds upon that initial finding in the toad bladder by Hays & Leaf.

Moreover, based on subsequent experiments, Hays and Leaf proposed that the reabsorbed water moves through the bladder wall by way of water channels. This proposal was quite controversial. But Dick's lab at Einstein pursued this question, and showed both that water channels exist, and that vasopressin increases their number.

Fast forward to twenty years ago: a scientist named Peter Agre at Johns Hopkins discovers a new gene whose function is unknown. Based on Dick's work, Dr. Agre hypothesizes that his new gene might encode a water channel. It turns out to be true, and in 2003 Agre wins the Nobel Prize for this finding. We now know that there are many varieties of these water channels, and they're important in many different cellular processes, in the eye, the brain, and other organs. All this, because of Dick Hays and his giant toads.

In addition to his research, Dick was a superb teacher. But more than that, he was a committed leader in medical education.

He directed the kidney course for medical students at Einstein for many years, and the students adored him, seeing him as that wise and good-natured uncle who always has your best interest at heart.

Along with Howard Steinman, Dick led an effort to ensure that Einstein students understand the scientific underpinnings of their patients' diseases.

He was an important figure in the development of case-based learning in the Einstein medical school curriculum. As Liise-anne Pirofski said: "He was a great champion of ideas and discussion, and worked hard to preserve both in the educational process."

He always had a special place in his heart for Jacobi hospital, and its role in teaching our students, and when Jacobi formed its own renal division, Dick was their strongest advocate.

We miss Dick: his science, his teaching, his bedside manner, his humor.

But because of him, our lives and our health have been deeply enriched.

We thank him for all he did for us, as we remember him and try to follow in his footsteps.

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**Editor's Note**

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