

Carleton biology professor knows how to keep his cool

Studies medical benefits of cold temperatures

By TOM SPEARS April 29, 2011



Carleton biology professor Ken Storey won the Fry Medal from the Canadian Society of Zoologists.

He has just won a national prize, but Ken Storey can't sit around chatting at his Carleton University office. This is frog season, and it keeps him hopping.

What Storey likes about frogs (also turtles and lizards) is their ability to freeze in winter and revive in spring. He also studies ground squirrels, which nearly freeze as they hibernate in the Arctic.

All this is intriguing in itself, but the science of very cold animals has an extra kick to it. Some day this research seems likely to help human medicine.

It already does. Doctors routinely chill, or completely freeze, parts of the human body. Organs for transplant are chilled while they're being transported from city to city. Cooling the body of a patient can reduce damaging inflammation in spinal cord injuries, and can "elongate biological time," slowing

cell death after a heart attack. Freezing can kill cancer cells within an organ. Cold water prevents brain damage in some people who are trapped underwater for many minutes.

There's probably more that cold temperatures can do for us, and Storey, whose specialty is molecular biology, is laying the groundwork.

He doesn't do medical research directly. "Our work is more basic," he says. "Ours is (about) ideas and concepts that the medics can sort through like a tool kit. ... We do things like cell cycles, and how genes turn on and off, and they do the more applied work."

That's the nature of basic research in many fields: The front-line scientist goes exploring and someone else comes along to put the new knowledge to use.

Frozen frogs are a field that was once considered finished. There was nothing left to learn back in 1989. The textbook said they produced a lot of extra glucose (sugar) and that let them freeze safely. Today, Storey's lab is peeling back layer after layer in the freezing puzzle, revealed by modern genetic tools.

"This adaptation to cold has actually affected every single thing the cell does. Fifty thousand proteins and 2,000 or 3,000 different processes going on. So, every time we think we've solved it — boom — there's another deeper layer."

One surprise: A frog that freezes makes proteins in its cells that other animals use to protect against overheating.

Another one: Most animal muscles weaken and shrink when they aren't used for a long time. It's called atrophy. Yet a ground squirrel that hibernates has heart muscles that actually grow bigger.

Storey also studies animals that can survive under the pressure of deep water or without oxygen. "Wherever the conditions are extreme, we study the animals that have managed to survive for millions of millions of years."

In the Ottawa area, his studies include the freeze-tolerant wood frog.

In recognition of his work, Storey, 62, has won this year's Fry Medal from the Canadian Society of Zoologists. It's the society's top award, given to one scientist each year for long-term achievement.

Last November, Storey also won a Flavelle medal from the Royal Society of Canada.

Storey himself isn't sure where his work will lead. "The problem with the unknown is that it's unknown," he says. "We don't know what else there is to learn."

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