

## News in focus

TRIUMF particle accelerator in Vancouver, and more cash for several other large facilities and institutes across the country. There will also be more than Can\$2 billion for the artificial-intelligence sector in Canada.

This budget “really emphasizes that Canada is determined to thrive in the twenty-first century based on science”, says Gaffield.

Others have pointed out that the vast majority of the money in the budget for the research councils is backloaded, with just Can\$228 million coming in the next two years. This means that the gains will be slow, and could be vulnerable to changes in the political climate, says Alex Usher, president of Higher Education Strategy Associates, a consultancy in Toronto. “Do not count on this money being there after an election,” he posted on X (formerly Twitter).

The budget also makes some changes to how science funding is organized. Instead of ten

different programmes for scholarships and fellowships, with differing levels of support, there will now be a single programme with just three levels – master’s degrees, PhDs and postdoctoral fellowships.

The government will also create a new “capstone” research-funding organization to better coordinate the work of the three grant-awarding councils and “advance internationally collaborative, multi-disciplinary and mission-driven research”, the budget says. It will also create an advisory Council on Science and Innovation, which will develop a national science-and-innovation strategy to guide priority setting and increase the impact of federal investments. “This should help move us towards a more efficient, well-coordinated and nimble way of supporting research in Canada,” says Gaffield. “I look forward to working with the government to optimize it.”

it endures a short period of starvation. Two hours after learning to dislike the odour, the worm has forgotten the negative association and is once again attracted to the smell.

To study memory formation, Rechavi’s then-graduate student Dana Landschaft Berliner put worms on ice and found that the animals retained their smell-related memories while chilled for at least 16 hours. As soon as the creatures were taken off the ice, however, their memory ‘clock’ seemed to restart; after three hours, they had forgotten their aversion to the smell.

Berliner identified several ways to affect worm memory. When the worms were cooled overnight before the memory training, they quickly forgot the odour, as usual. Worms given lithium and then put on ice held onto their memories just like counterparts that hadn’t received lithium. But worms given lithium also retained their memories at room temperature, whereas unmedicated animals did not.

# HOW TO FREEZE A MEMORY: WORMS PUT ON ICE STOP FORGETTING

The model organism *Caenorhabditis elegans* quickly forgets a notable odour – unless it is chilled.

By Julian Nowogrodzki

**R**oundworms have short memories, forgetting new information just two to three hours after learning it. But put them on ice and they don’t forget – until they are returned to room temperature, a study finds (D. L. Landschaft Berliner *et al.* Preprint at bioRxiv <https://doi.org/msww;2024>).

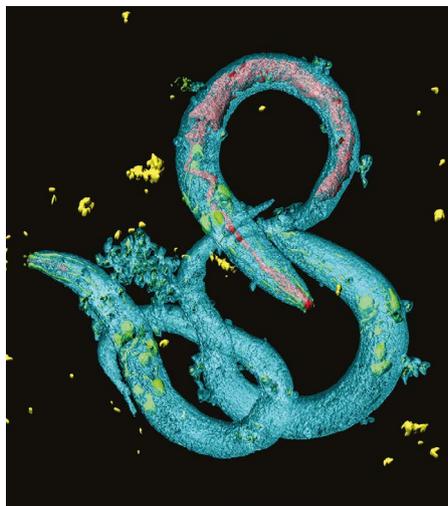
The worms, the laboratory workhorse *Caenorhabditis elegans*, retain their memories only if they’re cooled quickly. If they are allowed to acclimatize to the cold by spending the night in cool conditions before they are trained and placed on ice, they forget the information as fast as usual. If they are given the drug lithium, they also hang onto their memories for longer than normal, even at room temperature.

The work speaks to the mysteries of how memories are made and discarded. It also raises questions about why the keenness of a worm’s memories changes under different environmental conditions.

The research is “terrific”, says molecular biologist Ilya Ruvinsky at Northwestern University in Evanston, Illinois, who was not involved in the work. “Forming memories is an intrinsically interesting problem. But it doesn’t happen in isolation.”

The research was led by geneticist Oded Rechavi at Tel Aviv University in Israel and posted on the preprint server bioRxiv on 3 April. It has not yet been peer reviewed.

You can’t just ask a worm if it remembers something. To get around this, scientists train a worm to dislike a smell it would normally like by exposing the worm to that smell as



Putting the research stalwart *Caenorhabditis elegans* on ice boosts the worm’s memory.

## Forgetting switch

The key to these responses might be a signalling molecule called diacylglycerol. In *C. elegans*, it is known to regulate cellular processes related to memory and learning, and to be essential for smell-related learning.

In both the ice and lithium treatments, memory preservation was linked to reduced levels of diacylglycerol, the authors found. The team dubbed the diacylglycerol circuit the “forgetting switch” because of its involvement in delaying memory loss.

The connection between low diacylglycerol levels and lithium makes sense: lithium is known to inhibit an enzyme that makes a precursor to diacylglycerol. This is considered to underlie lithium’s effect in people with bipolar disorder, Rechavi says.

The scientists also found that memory retention is related to cell-membrane rigidity, which increases in the cold. Two strains of mutant worm that have unusually rigid membranes were slower than normal worms to forget, even at room temperature. Physical hardening of the membrane seems to delay forgetting, the experiments showed.

## Why forget?

As for the future, this research raises interesting questions on many levels: molecular, biochemical, genetic and evolutionary, says Rechavi. “Why do they forget, when the worms are perfectly capable of maintaining the memories longer?” He asks. “Is it because they’re optimizing for something? Perhaps there’s a reason for holding memories for the particular duration that they do.”

Rechavi’s lab is currently investigating whether similar memory phenomena happen in other organisms that can survive cold temperatures, such as certain turtle species. “It will keep us busy for a long time,” he says.

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