

► project, Tripathi says.

Another is a stalagmite in a cave in the northeastern state of Meghalaya. Last year, the International Commission on Stratigraphy, which sets new geological time units, designated this stalagmite as a marker for the Meghalayan age, which began 4,250 years ago.

Although several dozen sites have been declared National Geological Heritage Monument Sites by the Geological Survey of India (GSI), a central government agency, this is a designation and does not ensure the locations are protected, says Reddy. The responsibility for maintaining the sites falls to state governments, over which the GSI has no authority, he says.

A site in the western state of Gujarat that contains several dinosaur fossils<sup>1</sup> and evidence of a large dinosaur nest<sup>2</sup> shows what can happen without appropriate safeguards. In 1986, scientists working there discovered fossils, which were later identified as the snake *Sanajeh indicus* coiled around sauropod eggs. This was the first evidence of a snake species preying on dinosaur hatchlings<sup>3</sup>. But no measures were taken to secure these fossils until 1997, when part of the site was protected under the Bombay Police Act. By then, several fossils and eggs had disappeared from the site, Tripathi says.

The proposed law would establish a National Geoheritage Authority along with state geoheritage agencies that would advise state governments. The national authority would also help to establish geoparks to promote tourism, providing seed money to get the geoparks started. Damaging geoheritage or claiming intellectual-property rights for discoveries without the national authority's permission could result in imprisonment or fines of up to 1 million rupees (US\$14,400), according to the bill.

The proposed bill, titled The Geoheritage (Conservation and Promotion Bill), 2019, isn't the first such law to be proposed. In 2009 and 2013, two different groups pushed for laws to protect heritage sites, but these were not pursued by lawmakers on either occasion.

The situation is different this time because India's leading geologists, the Society of Earth Scientists and INSA, have joined forces to support the bill, says Dhiraj Mohan Banerjee, a Delhi-based geologist and a member of INSA.

The scientists campaigning for the bill also think that highlighting the value of these sites to tourism will appeal to lawmakers.

Tripathi and his team hope a member of parliament will back their cause and pursue the bill further. ■

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2. Mohabey, D. M. *Curr. Sci.* **52**, 1194 (1983).
3. Wilson, J. A., Mohabey, D. M., Peters, S. E. & Head, J. J. *PLoS Biol.* **8**, e1000322 (2010).



ACCENT ALASKA/ALAMY

The University of Alaska Fairbanks is the flagship of the state's higher-education system.

## FUNDING

# Alaska's scientists despair over cuts

*Governor slashes support for public universities by 40%.*

BY JONATHAN LAMBERT

**K**at Milligan-Myhre, a microbiologist at the University of Alaska Anchorage, has simple advice for her current graduate students: get out as fast as you can.

Milligan-Myhre is one of roughly 1,300 academics whose jobs are at risk after Alaska Governor Mike Dunleavy slashed US\$130 million from the University of Alaska (UA) system's budget last month. The state legislature has so far failed to override the cut, which amounts to roughly 40% of the state's contribution to the university and will take effect this academic year.

Researchers are waiting anxiously to see how university administrators will apply the cuts, which could fundamentally reshape science in the state — including UA's world-class Arctic and climate research programmes. The first hint came on 30 July, when the university's governing board voted to consolidate the system's three main branches — in Anchorage, Fairbanks and Juneau.

"It's awful," says Milligan-Myhre. "I had to turn away a student planning on starting in the fall because I just don't know what the department or his degree would look like in a year or two." She's also encouraging her current students to graduate as soon as possible.

The university's governing board has asked UA president Jim Johnsen to present a detailed merger proposal in September. It will start making cuts as soon as possible once a final plan is in place.

What is clear is that "no one is immune" from the budget pain, says Glenn Juday, a professor emeritus of ecology at UA Fairbanks. On 22 July, the UA governing board declared financial exigency, a sort of academic martial law that gives it emergency powers to lay off staff and faculty members — including tenured professors — and even to scrap entire campuses.

The massive but nebulous nature of the cuts makes planning for the future difficult across the university. "All the uncertainty is stressing me out a lot," says Kelly Ireland, who is studying for a master's degree in biological sciences at the UA Anchorage. A grant from the US Department of Homeland Security will pay for her final year of research, but Ireland worries that her adviser — Milligan-Myhre — will be laid off before she graduates.

"I was thinking of applying to the PhD programme here, but I'm going to wait and see how this all shakes out," Ireland says.

She is also worried that layoffs among the administrative staff, who shepherd grant applications through bureaucracy and keep



departments running, will limit research at the university. “Right after the legislature failed to override the governor’s cuts, I went into lab and prepped all the tubes I’d need to finish every single sample, which is literally 3,000 tubes,” she says. “I’m worried that they might cut the person who orders all our tubes and equipment.”

Brandon Briggs, a geomicrobiologist at UA Anchorage, is also feeling the pressure. “All this uncertainty has definitely decreased productivity,” he says. “Instead of writing the next paper, I’ve been going to board meetings and trying to reassure students who’ve just been told their scholarships are gone.”

That’s because Dunleavy defunded a scholarship programme for Alaskans attending UA. “As of July 1, four thousand students got a letter notifying them that their scholarships will not be renewed this fall,” says Briggs.

The budget cuts have already altered some researchers’ plans. Milligan-Myhre, who studies a native Alaskan fish called the three-spined stickleback (*Gasterosteus aculeatus*), has dropped out of a “once in a lifetime” ecological experiment. Dozens of researchers

from across the globe plan to combine various stickleback populations in ten lakes that have previously been treated to kill all invasive fish. The idea is to track how differences in the lakes’ ecosystems influence a host of traits in the fish — from the composition of their gut microbiomes to characteristics of their brain tissue — over decades, revealing evolution in action.

**“This is just a terrible situation. And it’s just going to continue.”**

to devote to this project because I’ve got to be writing my butt off the next few months,” she says. “I need to get as many papers out as I can to prep my CV for job applications, because I have no job security. [The university] can fire me with 60 days’ notice.”

The funding crisis also threatens some of UA’s flagship climate-research facilities, such as the International Arctic Research Center in Fairbanks or the nearby Bonanza Creek Long Term Ecological Research site. Although the

Milligan-Myhre is using the time she would have spent on the experiment to hunt for work. “I just don’t have time

majority of their funding comes from outside sources, such as the US National Science Foundation, Juday says that a core level of institutional support holds the centres together.

“It’s like a bucket,” he says. “If you take away the bucket, then you can’t fill up the bucket” with grants from other funders.

Hajo Eicken, a glaciologist who heads the International Arctic Research Center, says that the budget cuts threaten programmes aimed at helping Alaska’s communities to cope with climate change. These include efforts to improve weather forecasts in remote areas and to protect roads and other infrastructure from damage caused when permafrost thaws. “A big part of our mission is making our research matter for Alaskans,” says Eicken. “These programmes provide tremendous value to the people of Alaska, and they’re under significant threat.”

And more cuts could be coming. Dunleavy, who was elected in November 2018 to a four-year term, has said that he plans to trim the state’s budget further in the coming years.

“This is just a terrible situation,” says Milligan-Myhre. “And it’s just going to continue.” ■

## DISEASE RESEARCH

# ‘Mosaic’ HIV vaccine to be tested in thousands of people

*The experimental vaccine targets virus strains from around the world.*

BY EMILIANO RODRÍGUEZ MEGA

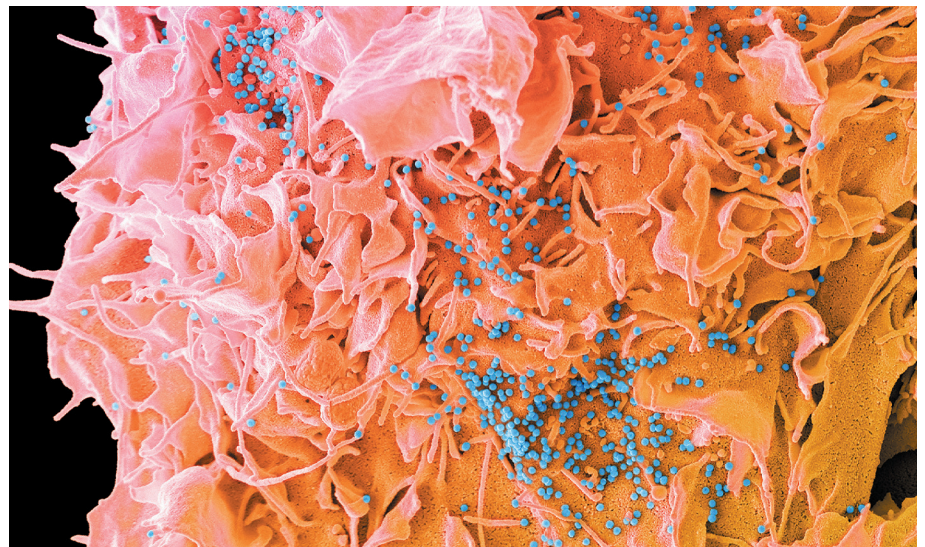
An experimental HIV vaccine that targets more strains of the virus than any other developed so far will start a late-stage clinical trial later this year. The ‘mosaic’ vaccine, which incorporates genetic material from HIV strains from around the world, also seems to have the longest-lasting effects of those that have been tested in people.

Small trials of the mosaic vaccine in people showed that it prompted an immune response against HIV, such as the production of antibodies. But starting in September, scientists will administer it to thousands of people across the Americas and Europe to assess whether the vaccine provides any protection against HIV infection. The phase III trial will test the vaccine in transgender individuals and in men who have sex with men.

These communities are disproportionately affected by HIV, with about two-thirds of new infections in the United States occurring among gay and bisexual men, according to the US Centers for Disease Control and Prevention in Atlanta, Georgia. The researchers

running the trial, which they have named Mosaico, discussed the project during the 10th International AIDS Society Conference on HIV Science in Mexico City at the end of July.

Adding an effective HIV vaccine to the arsenal of preventive measures currently available to protect people from infection, which include condoms and an antiretroviral ▶



The HIV virus (blue), shown attacking an immune cell, mutates rapidly, confounding efforts to combat it.

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