force, gravity, into the mix assign it a hypothetical 'graviton' particle. The team proposed a super-twin for the graviton called the gravitino. Van Nieuwenhuizen remembers the night he watched their computer program crunch through the supergravity calculations, fearful it would prematurely grind to a halt, indicating that the theory was wrong. "I sat there with mounting tension," he says. But when the program reached its conclusion successfully, he was convinced supergravity was real.

Some 40 years later, van Nieuwenhuizen was left speechless by the news of the award. "I'd given up hope it would happen," he says.

David Tong, a string theorist at the University of Cambridge, UK, says that the innovation behind supergravity was "astonishing", given that at the time particle physicists and gravity researchers rarely interacted. "Here, the team was applying particle-physics techniques to gravity and then testing them computationally, when nobody was using computers to do this sort of thing," says Tong.

Today, supergravity is a cornerstone of string theory, a popular candidate for the ultimate description of reality. But for decades, particle accelerators, including CERN's Large Hadron Collider (LHC), have failed to spot any signs of the gravitino, or any evidence for string theory — although this does not rule it out completely. "These ideas may just not be testable in our lifetime," says Tong.

A lack of evidence should also not detract from supergravity's achievements, argues Strominger, because the theory has already been used to solve mysteries about gravity. For instance, general relativity apparently allows particles to have negative masses and energies, in theory. "If that was true, some things wouldn't fall to Earth when dropped, but fall into space," says Strominger. That does not happen, but no one could explain why not. Turning supergravity's machinery to general relativity enabled physicists to prove that particles cannot have negative masses and energies.

But Sabine Hossenfelder, a theoretical physicist at the Frankfurt Institute for Advanced Studies in Germany, warns that the lack of evidence from the LHC deals a near fatal blow to supergravity's chances of being true. She says that the winners have "done great mathematical work that deserves recognition", adding, "but perhaps the award should be for pure mathematics, because this is not physics." ■

GEOLOGY

India's geologists seek law to protect fossil treasures

Among those at risk of vandalism or development is the site of a major extinction event.

BY PRIYANKA PULLA

India's scientists are lobbying lawmakers to protect the country's myriad geological sites and fossils from looting and development. Among the country's geological gems are a large, scientifically significant dinosaur nest and a formal marker for a geological age.

On 6 August, the Indian National Science Academy (INSA) in New Delhi and the Society of Earth Scientists in Lucknow presented a draft bill to politicians. If enacted into law, the bill will create a national agency that has the power to designate geological and palaeontological sites, and to restrict access to them.

India currently has no national laws that conserve these resources, says Delhi-based geologist Satish Tripathi, a member of the Society of Earth Scientists and an adviser on the bill. A few important sites are protected under local laws, but many are not protected at all. As a result, there is little to prevent the theft of fossils and geological relics, or to stop developers and mining companies from destroying sites, a document accompanying the draft bill states.

Conservationists have struggled for years to guard important geological locations. But India's rapid development over the past decade has increased the urgency, says Tripathi. "The law has to be created, or such sites will vanish," he says.

At least a couple of hundred sites could need safeguarding, estimates sedimentologist Rajasekhara Reddy Dhanireddy, an adviser to the Indian National Trust for Art and Cultural Heritage, a non-profit organization in New Delhi.

AMIT DAVE/REUTERS

Dinosaur eggs have been pilfered from unprotecte fossil sites in India.

TREASURE TROVE

Among the artefacts in need of safeguarding is a 6-centimetre-thick layer of soil in the state of Himachal Pradesh's Spiti Valley. Scientists have tied the layer to an extinction event that took place around 252 million years ago. An exposed section of this layer, which separates shale from the Permian period from Triassic limestone above it, is in danger from a road ▶

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[1] and evidence of a large dinosaur nest[2] 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[3]. 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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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

Kat 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