

► funded institute where Shin was president from 2011 to 2017 before taking over the presidency of KAIST.

The ministry's audit team uncovered the alleged misuse, and the South Korean broadcaster SBS first publicized the allegations on 25 November. The ministry says that some of the 2.2 billion won was paid to one individual, a former student of Shin's, and that this could constitute embezzlement.

Shin refutes the allegations. In an e-mail from KAIST, sent in response to questions from *Nature's* news team, Shin said that neither he nor DGIST was involved in any illegal activities, misconduct or embezzlement regarding LBNL, which is owned by the US Department of Energy (DOE). "The collaboration contract between two institutions was fully approved through all proper rules and regulations of the DOE and LBNL's contracting processes," he said.

As president of DGIST, Shin brokered an agreement with LBNL in 2012 that gave his institute's researchers the chance to work with one of the world's most respected physics labs. The collaboration received ten weeks of beam time, which DGIST did not pay for. The agreement expanded in 2014, and again two years later, securing DGIST half of all available time on one of LBNL's X-ray microscopy beamlines,

which its researchers used to explore nanomaterials. As part of the arrangement, DGIST paid an annual facility fee.

On 10 December, LBNL sent a letter to the ministry — seen by *Nature* — supporting Shin's version of events. It says that the agreement with DGIST was a customary approach to conducting collaborative research with international partners and that the reported allegations "contain significant errors in fact and in assumptions". The letter also said that the collaboration required significant instrument time beyond the scope of a standard short-term project, and that the payments supported the operation and staffing costs of running the beamline.

A petition in support of Shin, organized by the KAIST physics department — where Shin worked from 1989 to 2011 — had collected more than 830 signatures from researchers at South Korean institutions by 14 December.

The petition says that calls to suspend Shin lack due process because they are based on an ongoing investigation and unproven accusations. "There simply is not enough evidence

"There simply is not enough evidence to justify suspending him from his duties."

to justify suspending him from his duties," the petition states. The ministry has "treated him like a criminal", says one of the petition organizers, who requested anonymity because they fear retaliation from the government for speaking out.

The science ministry said in two statements that the request for Shin's suspension was carried out in accordance with the ministry's authority to regulate public institutions.

The ministry has also accused Shin, two other DGIST professors and Shin's former student — now a staff scientist at LBNL — of misconduct. It alleges that they did not follow the correct process when granting the former student an adjunct position at DGIST during Shin's presidency, and referred them to prosecutors on 28 November.

Shin told *Nature* that he did not offer the student favourable treatment. In a press conference on 4 December, he also said he had had nothing to do with determining their salary or hiring at LBNL or DGIST.

In its letter, LBNL says its researcher is an expert in soft X-ray microscopy; that it had followed its own hiring and salary disbursement procedures; and that no DGIST funds had been sent directly to the researcher.

The ministry did not respond to *Nature's* questions about LBNL's letter or the petition. ■

ITALY

Scientists slam donation to question vaccine safety

Italian National Order of Biologists donated €10,000 for research into vaccine ingredients.

BY GIORGIA GUGLIELMI

Some scientists in Italy are up in arms over a donation from the organization that oversees the nation's professional biology qualification to an advocacy group that opposes mandatory childhood vaccination.

The news comes as Italian politicians debate whether to continue with the mandatory vaccination policy, which was introduced in 2017 and requires parents to provide proof of ten routine vaccinations when enrolling their children in nurseries and preschools.

The advocacy group, Corvelva, announced that it had received €10,000 (US\$11,350) from the National Order of Biologists (ONB) on 26 October says that it plans to use the money for research that investigates the safety and efficacy of commonly used vaccines. Corvelva says that previous studies it has funded, which have not yet been published in a peer-reviewed

journal, indicate that some vaccines contain impurities, or lack the active ingredients they are claimed to contain.

ONB president Vincenzo D'Anna told *Nature* in an e-mail that there is a need for truly independent vaccine research because, in his opinion, work conducted in public laboratories and at universities is usually influenced or funded by companies that produce vaccines. "The goal is to contribute to complete the biological and chemical analyses on vaccines," he said in the e-mail interview, part of which the ONB has published in its Bulletin.

But many scientists dismiss the need for the additional research — on the grounds that vaccines are already rigorously tested — and are

flummoxed by the ONB's donation.

"There's solid evidence that vaccines work and are safe," says virologist Giorgio Palù at the University of Padova, who is president of the European and Italian societies for virology.

Membership in the ONB confers certification for jobs in the biological sciences in Italy. The order has about 50,000 members who each pay an annual membership fee of €120.

The large-scale, expensive studies that test vaccines' efficacy and monitor for adverse side effects are regulated and supervised by national and international health agencies and are "far more accurate than tests that could be done with €10,000", says Gennaro Ciliberto, a molecular biologist at the University of Catanzaro Magna Graecia and president of the Italian Federation for the Life Sciences, which includes 14 scientific societies.

Once vaccines are approved, these agencies continue to monitor them by testing batches

"Studies that monitor reactions 'cannot exclude the possibility that vaccines are toxic.'"

and production facilities for safety, as well as tracking adverse reactions, he adds.

But Marchi says studies that monitor adverse reactions don't track participants for long enough, and "cannot exclude the possibility that vaccines are toxic".

D'Anna emphasized that the donation to Corvelva is not the full amount that will be spent on the research.

Corvelva has collected more than €50,000 so far, says Marchi. The organization will use the money to check whether vaccine components are indeed those indicated on the label, and to look for contaminants. Marchi says that the group hopes to influence the debate on whether to continue with the 2017 mandatory-vaccination policy.

Giovanni Maga, a molecular biologist at the National Research Council's Institute of Molecular Genetics in Pavia, worries that the ONB's decision to fund this research could increase public distrust of vaccines.

D'Anna rejected this idea. On the contrary, he said, more people will choose to vaccinate their kids if "we could guarantee them the absolute safety of vaccines".

D'Anna said that neither he nor the ONB can be defined as 'no-vax', a term used in Italy to refer to people who are against vaccinations, and says that he has never questioned the efficacy of vaccines. "The ONB and the biologists know well the merits of vaccines, and want to know all the rest about their safety," he said.

The debate about the donation follows criticism of a conference to celebrate the ONB's 50th anniversary in March. Some academics and scientific societies urged the ONB to revise the agenda because they were concerned that anti-vaccine ideas could be promoted, although the ONB rejects this criticism.

The donation and the choice of speakers at the March meeting are included in a petition calling for the Ministry of Health, which oversees the governance of the ONB, to remove D'Anna as ONB president. The petition, created by three graduate biology students, says that these and other actions by the ONB endanger public health and discredit the scientific community.

In a telephone interview with *Nature*, D'Anna said he won't step down. And in the e-mail interview, he dismissed the seriousness of a petition launched by students. He said that those who want to verify whether "hundreds of biological and chemical impurities" can harm children do not endanger public health.

A spokesperson for the Italian Ministry of Health says that it has received "a report on the matter" of the ONB donation to Corvelva, and that the ministry asked the ONB "to provide information on the subject". The ministry doesn't fund the ONB, but it is tasked with ensuring that the governing board abides by its duties. ■



Icy southern waters help to blunt climate change by pulling carbon dioxide from the atmosphere.

CLIMATE CHANGE

Southern Ocean spotted burping CO₂

Ocean-float data reveal that waters off Antarctica don't absorb as much carbon as scientists thought.

BY JEFF TOLLEFSON

The Southern Ocean is one of humanity's allies, slowing global warming by absorbing heat and carbon dioxide from the atmosphere. But now researchers report that the choppy waters around Antarctica are also quietly belching out massive quantities of CO₂ during the dark and windy winter, reducing the ocean's climate benefit.

The scientists behind the work, presented last week at a meeting of the American Geophysical Union in Washington DC, say that the winter emissions reduce the Southern Ocean's net uptake of CO₂ by 34%, or more than 1.4 billion tonnes per year. That amount is roughly equal to Japan's annual carbon emissions.

"The Southern Ocean is still going to be important in the global carbon cycle," says Seth Bushinsky, an oceanographer at Princeton University in New Jersey who is leading the study. "We're just trying to understand exactly how and why."

The ocean's winter CO₂ emissions, which were tracked by a fleet of robotic floats, occur when deep waters rise to the surface and release centuries-old carbon. This is part of a larger process of ocean circulation that

moves heat and nutrients around the globe, but researchers have struggled to pin down precisely how the overall system works, in part because of a dearth of data.

For years, scientists have based their estimates of carbon uptake in the Southern Ocean on measurements made by ships sailing to and around Antarctica, but the data are sparse — particularly for the winter months.

The latest work factors in 3.5 years of data from 65 floats deployed as part of the US\$21-million Southern Ocean Carbon and Climate Observations and Modeling (SOCCOM) project. The floats bob up and down in the upper 2,000 metres of the ocean, measuring temperature, salinity, oxygen, carbon and nutrients — information that can be used to infer how much carbon is moving into and out of the ocean.

The first estimate based on the SOCCOM floats alone, published in August, reduced the Southern Ocean's carbon uptake by more than 90%, compared with previous calculations based on ships' measurements (A. R. Gray *et al. Geophys. Res. Lett.* **45**, 9049–9057; 2018). But the discrepancy raised eyebrows, and prompted concerns about potential bias in the float estimates.

To produce its latest estimate, which ▶

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