

extracted under torture. Faced with international criticism, the Mexican government agreed to allow GIEL to investigate.

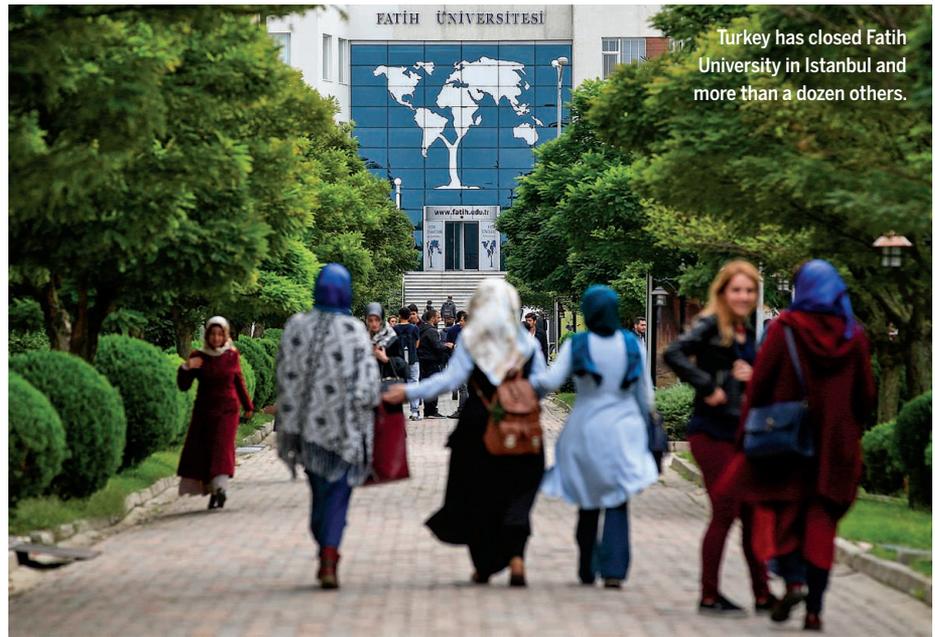
The expert group called on Torero. Born in Peru and trained at the University of California, Berkeley, Torero has investigated many high-profile fires, including those that brought down the Twin Towers in New York City. The cartel members had testified that they incinerated the bodies on a pyre of wood and tires in the open air. Torero's calculations suggested that fully incinerating 43 bodies in the manner the cartel described would have required a staggering amount of wood: between 20,000 and 40,000 kilograms. He also doubted that it would be possible to nearly eliminate organic matter from the remains with an open-air fire, rather than with a furnace. And when he visited the Cocula dump in July 2015, he saw no evidence of a massive fire. He concluded that it was impossible the students had been burned there (*Science*, 11 March, p. 1141).

In an 8 June report, the attorney general's office called for experimental verification. Torero independently took up the challenge. He and a dozen students simulated the alleged pyres at Cocula in a field at his university's Gattton campus, outside Brisbane. They used bone-dry wood, stacked precisely, and left out tires, which would have made the fire less efficient. The experimental setup, Torero says, represented "the ideal scenario."

His team systematically burned pig carcasses. Even when using 630 kg of wood for a single 70-kg pig, 10% of the pig's flesh remained after the fire burned out, Torero told *Science*. Forty-three bodies of a similar weight, therefore, would have required more than 27,000 kg of wood, and organic matter would have survived the fire. Even if the cartel had been able to find that much wood in Cocula, the intense bonfire would have scarred nearby tree trunks, Torero says. Visiting the dump 10 months after the disappearances, he saw no such scars.

Torero also burned up to four pig carcasses at once to explore whether body fat would fuel the fire and promote total incineration. Each added carcass weakened fire intensity, the team found. Burning 43 bodies together, therefore, would require much more wood than burning each separately. "Bodies are a large percent water," Lentini says. "They're not great fuel."

Torero plans to submit his findings for peer review in the fall. In the meantime, he hopes his experiments will prod investigators in the grisly case to move beyond Cocula. "We should stop looking into the dump," Torero says, "because that's not what happened." ■



Turkey has closed Fatih University in Istanbul and more than a dozen others.

ACADEMIC FREEDOM

Turkey shakes up universities as coup fallout continues

Grants are frozen, campuses closed, and staffers fired

By John Bohannon

For Turkish researchers and educators, the aftershocks of the failed 20 July military coup are continuing. After it crushed the uprising, the government launched a political purge, firing or suspending some 50,000 public employees, including many academics. Now, just weeks before the start of the academic year, Turkey has launched a broader reorganization of higher education.

On 1 September, using powers granted under an ongoing state of emergency, the government fired an additional 2346 university staff and revamped the employment contracts of some 10,000 teaching assistants at public universities, most of them Ph.D. students; the assistants are now contract employees instead of permanent hires, making them easier to fire. Officials have also closed 15 private universities and launched a fresh wave of firings at secondary schools. Turkey's science funding agency, TÜBİTAK, has postponed new calls for proposals. And to the dismay of international collaborators, officials shut down a major archaeological dig.

There was one sign that the turmoil may be abating: Officials reinstated 1386 of the 1577 university deans they had suspended

after the coup. Still, "this purge in academia will have dire consequences for science in Turkey," predicts Mehmet Ali Alpar, a physicist at Sabancı University in Istanbul, Turkey.

The government says the changes will help root out members of an Islamic group led by Fethullah Gülen, a preacher now living in the United States, who they allege organized the coup. Ironically, Alpar notes, Turkish President Recep Tayyip Erdoğan was once allied with Gülen's movement, which "has infiltrated the police, army, judiciary, and universities systematically."

Many Turkish academics describe an atmosphere of suspicion and paranoia. "All of us who are for science and reason are afraid of losing our jobs," says one university biologist, who requested anonymity because he fears reprisals. Officials recently escorted him into a campus office for what he calls a "ridiculous interrogation." A lawyer representing the university read a series of questions about his ideology and politics, and the dean of his department and faculty from several others listened to his answers. Officials later notified the biologist that he was cleared to work, but he was denied permission to attend two scientific conferences in Europe where he was planning to present his research. "I am at the very center of the chaos," he says.

One of the biologist's friends, an archaeologist, didn't fare as well. She was dismissed because she earned high marks last year on a national exam, he says. Turkish media have reported that the answers to the exam were distributed in advance to Gülen followers. *Ipsa facto*, those who scored well on the exam are Gülenists, the biologist says. "But I know that she is a highly intelligent person and that is the only reason for her high grade."

Scholarly societies outside Turkey are closely watching events. At a 6 September meeting in Brussels, members of the European University Association (EUA) raised concerns about academic freedom with officials from Turkey's Higher Education Council (YÖK), and questioned them about university closures. "YÖK has reassured us that all [students from the closed private universities] have the option of being transferred to public institutions," says Michael Gaebel, EUA director of higher education policy in Brussels. However, "given the start of the new academic year, and the relatively large number of students, this is of course a big challenge." He says more changes are in the works, including plans to merge three universities in Izmir into a gigantic new public university.

Most critics of the government within Turkey have gone silent, but some academic organizations are speaking out. The government is using "the purge of Gülenists as a pretext to reorganize universities," reads a statement issued last week by Turkey's Association of University Councils. The statement cites the suspension of TÜBİTAK fellowships and funding programs "in addition to the ongoing unlawful sackings and intimidations [of] scientists." Alpar, who is president of the Turkish Science Academy, says the turmoil will end up "discouraging young researchers from staying in Turkey or returning."

Archaeologists, meanwhile, are absorbing the government's surprise decision to shut down a long-running international dig at Ephesus, a Greek and Roman site near Selçuk, as well as a smaller excavation in nearby Limyra. Turkish officials notified the Austrian Archaeological Institute in Vienna, which has been involved in the Ephesus project for more than a century, that they had withdrawn permits. They gave no reason, but relations between Turkey and Austria have been strained since Austria's chancellor, Christian Kern, said in August that Turkey was not fit to join the European Union. Austrian science minister Reinhold Mitterlehner bemoaned the breach in a 4 September statement. "With this step," he said, "the freedom of science is continuing to decline." ■

With reporting by Erik Stokstad.

SCIENTIFIC MISCONDUCT

Former star surgeon's disgrace rocks Swedish science

Investigations into the Paolo Macchiarini scandal highlight misconduct and institutional failings

By **Gretchen Vogel**

What seemed a coup has turned into a nightmare for Sweden's most prestigious university, the Karolinska Institute (KI). In 2010, KI and its associated hospital in Stockholm managed to recruit star surgeon Paolo Macchiarini, who had made international headlines when he implanted artificial windpipes into patients. With his groundbreaking tissue engineering work, KI leaders hoped he would propel the university to the top of a hot field.

Instead, Macchiarini has plunged Swedish science and KI into their most serious misconduct scandal in decades, with allegations ranging from faking scientific data to subjecting patients to a risky procedure without the necessary approvals, in at least two cases leading to their deaths. Over the past 2 weeks, four investigations have released their damning findings. One confirms that Macchiarini committed misconduct, and the other three paint an unflattering image of the roles KI and the hospital have played in the affair. The entire episode "is a sad failure of

the academic community to take care of its own mistakes," says Hans Rosling, a retired international health professor at KI.

The case has already led to a wave of resignations and dismissals, both at KI and the Nobel Assembly, the august body of 50 KI professors that selects the winners of the Nobel Prize in Physiology or Medicine. But restoring trust won't be easy. A recent survey by a leading Swedish polling company found that KI's reputation had plunged as a result of the scandal.

Macchiarini created artificial tracheae to help patients with a missing or damaged windpipe. He "seeded" them with a patient's own stem cells, hoping the cells would proliferate and cover the artificial scaffold to create a fully functional organ. But the implants didn't work. Two of his Stockholm patients died; a third has been in intensive care since 2012. Several Russian recipients died as well.

In 2014, colleagues from the hospital asked KI to investigate possible misconduct in Macchiarini's papers and in the ethics and consent documents for the surgeries. The recipients were not as seriously ill as Macchiarini claimed, they said, and his descriptions of patients' improvement after surgery were falsified. KI officials asked Bengt Gerdin, a retired professor of surgery at Uppsala University in Sweden, to investigate. Gerdin found that the allegations had merit, but KI stood by its wunderkind: In August 2015, then-Vice-Chancellor Anders Hamsten said that Macchiarini's rebuttal to the report was convincing and dismissed the charges.

The case was rekindled in January by a three-part TV documentary that painted a troubling picture of Macchiarini's treatment of patients in Sweden and Russia and the way KI had handled the allegations. After the final episode aired, KI announced it would cut ties with Macchiarini when his contract ended in November and asked the Swedish Central Ethical Review Board (CEPN) to reinvestigate the misconduct charges. It also commissioned an independent investigation into its own role, as did the hospital. In March, the university disciplinary board decided it had learned enough about Macchiarini's conduct to fire him.

The hospital's report was made public

Shakeup in Stockholm

Since February, the following people were dismissed (●), resigned (●), or were asked to resign (●) as a result of the Macchiarini scandal.

KAROLINSKA INSTITUTE	STATUS
Anders Hamsten, vice-chancellor	●
Hans-Gustaf Ljunggren, dean of research	●
Jan Carlstedt-Duke, adviser to the vice-chancellor	●
Paolo Macchiarini, senior researcher	●
Lars Leijonborg, chairman of the board	●
All other board members	●
NOBEL ASSEMBLY	STATUS
Urban Lendahl, secretary-general	●
Anders Hamsten, member	●
Harriet Wallberg-Henriksson, member	●
SWEDISH HIGHER EDUCATION AUTHORITY	STATUS
Harriet Wallberg-Henriksson, chancellor	●

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