

— whose young feed on and eventually kill their hosts — that target African cotton leafworm (*Spodoptera littoralis*) have already switched to feasting on the fall armyworm.

During recent field trials in Yunnan Province, where the pest was first identified, researchers based at the Institute of Plant Protection (IPP), part of the Chinese Academy of Agricultural Sciences in Beijing, have also found that the stink bug *Arma chinensis* kills the caterpillar.

PEST CONTROL

There could be many natural parasites or predators that target the pest, says Zhong Guohua, a researcher at the South China Agricultural University in Guangzhou who is working on controlling the fall armyworm, but whether

they can ultimately be used for control it is difficult to predict. Finding out would require repeated testing to ensure that the predator is effective across large areas, and can be bred in large enough numbers, says Zhong.

In some countries, such as Brazil, the pest has been managed by growing transgenic food crops that contain genes from the bacterium *Bacillus thuringiensis* (Bt). The genes offer crops resistance to some pests, including the fall armyworm.

But Bt food crops have not been approved for commercial use in China, in part because

“The spread of fall armyworm in China will have a significant impact on consumers.”

of strong public opposition to genetically modified food, says Du Li, a specialist in biotechnology law at the University of Macau.

The growth of Bt maize across a large area of China would definitely have helped to control the pest, says Li Yunhe, a biotechnology researcher at the IPP.

But Hu says that it's not clear whether the crop can keep the pest at bay in the long term. In countries such as the United States, the insect has developed resistance to Bt crops, he notes.

Hu says that eradication in China is now unlikely, and that farmers will have to learn to manage the pest. Other major crop-producing countries are also in the insect's path — researchers predict that it will probably enter Japan and South Korea between now and next month. ■

RESEARCH MISCONDUCT

What universities can learn from epic case of research fraud

Analysis of misconduct investigations suggests institutional probes aren't rigorous enough.

BY HOLLY ELSE

By day, Andrew Grey studies bone health. But over the past few years, he's developed another speciality: the case of one of science's most prolific fraudsters.

From 1996 to 2013, Yoshihiro Sato, a Japanese bone-health researcher, plagiarized work, fabricated data and forged authorships — prompting the retraction of more than 60 studies from the scholarly literature so far. Grey and colleagues at the University of Auckland in New Zealand and the University of Aberdeen, UK, are among the researchers who have raised concerns about Sato's work over the past decade or so, and they have studied the case in detail — in particular, how universities involved in the research investigated concerns about his work and allegations of misconduct.

At the World Conference on Research Integrity in Hong Kong from 2 to 5 June, Grey's team described its years-long efforts to clean up Sato's literature, and presented its analysis of the inquiries conducted by four universities in Japan and the United States ensnared in the scandal. The team published its analysis of three investigations in February (*A. Grey et al. Res. Integr. Peer Rev.* 4, 3; 2019). Grey says the findings support a growing view among some in the academic community: that university investigations into research misconduct are often inadequate, opaque and poorly conducted. The team says that the results challenge the idea that institutions can police themselves on research

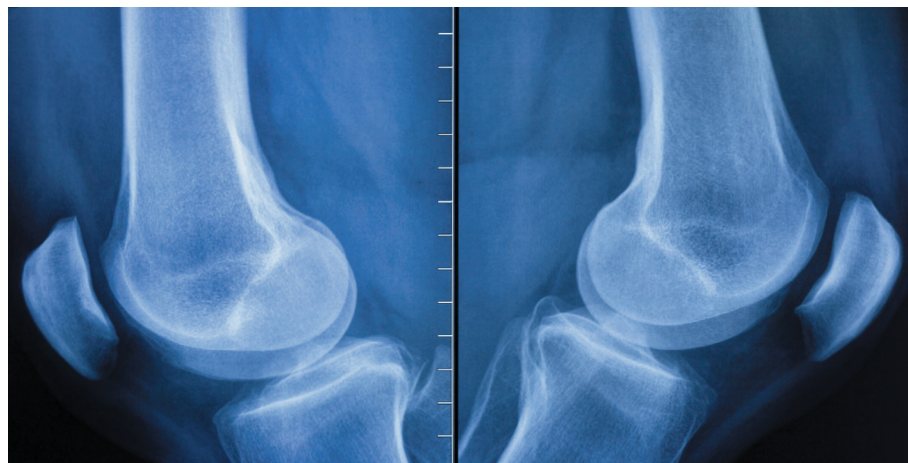
integrity, and proposes that there should be independent organizations to evaluate allegations of research fraud.

The analysis is one of just a few to look closely at research-misconduct investigations, and the first to use a systematic approach to rate them, says C. K. Gunsalus, a specialist in research integrity at the University of Illinois at Urbana-Champaign, who was not part of the analysis. Too many research-misconduct investigations turn out to be inadequate or flawed, says Gunsalus. She had a hand in creating a 26-point checklist that university officials can use to guide probes into research misconduct; Grey's team used this to rate the investigations.

The checklist questions an investigation's scope, reliability and impact — for instance, whether the investigating committee included external members and whether evidence could have been tampered with. Two members of Grey's team independently assessed each investigation report using the checklist. “Overall, each report was considered unacceptable by both assessors,” say Grey and colleagues.

ALARM BELLS

Sato, who died in 2016, studied and ran clinical trials of drugs and supplements that might help to prevent bone fractures. Researchers in the field began raising concerns about his work ▶



The field of bone health was hit by a sprawling case of research misconduct that affected tens of studies.

► in the mid-2000s, when some questioned the speed with which Sato had recruited and assessed participants for some of his studies. He later apologized for not disclosing all the hospitals from which he had recruited participants, and admitted that there was a mistake in one paper. But more researchers started flagging irregularities in his papers to journals, and, in 2016, Grey and his colleagues published an analysis that raised concerns about 33 of Sato's studies (M. J. Bolland *et al. Neurology* 87, 2391–2402; 2016). Sato admitted that three of these studies were fraudulent, asked for them to be retracted and cleared his co-authors of any wrongdoing. Twenty-seven of the studies have now been retracted.

In 2017, Grey's team also flagged concerns about hundreds of Sato's papers to four institutions that employed co-authors of these studies: Kurume, Hirosaki and Keio universities in Japan, and New York University's Winthrop Hospital. Sato had been a researcher at Kurume University. Two institutions had already launched investigations into some of the work when Grey contacted them, and the others began investigations.

The researchers asked the institutions for the reports of their investigations, to understand how they had responded to the allegations. None of the reports revealed exactly who or which papers had been investigated.

One found that an unnamed researcher had committed misconduct; two reports recommended that papers be retracted.

Grey's team rated each report as inadequate overall. The researchers also suggest that the investigations focused too much on determining whether research misconduct had occurred, rather than on understanding the validity of the research in question and correcting or retracting unreliable articles. Grey and his colleagues argue that protecting the integrity of the literature should be the priority of any investigation — because integrity can be compromised without evidence of misconduct.

FURTHER REVIEW

Gunsalus agrees that the Sato case highlights some of the problems with misconduct investigations, and says that if shortcomings emerge, further reviews might be needed. She suggests that institutional panels should include external members, and that officials should use a standardized checklist to strengthen their processes. “There should be some way for journals, funders, patients and others to be assured of the credibility and thoroughness of

university reviews,” she says.

Grey's findings also suggest that institutions in Japan — which has seen several high-profile research-misconduct cases in recent decades — should review their processes for investigating misconduct, says Alan Price, a research-misconduct consultant in Texas.

The universities did not respond directly to criticisms of the investigations, which *Nature* flagged to them, but offered further details about their inquiries and the outcomes. Winthrop Hospital said that it spent more than a year investigating the concerns, including digging up receipts for lab equipment, but found no misconduct. Keio University said that its investigation included external experts and statistical analysis of data; it found no research misconduct, but some errors in methods and typos in studies.

Kurume University asked a committee of statisticians and medical researchers to investigate 39 papers authored by Sato, and found some data falsification and inappropriate authorships. It said that it cannot conclude whether fraud was involved in another 32 papers, because Sato is dead and records for these experiments no longer exist. Hirosaki University — whose 2017 investigation found research irregularities in 14 research papers, 7 of which had already been retracted — did not respond to *Nature's* request for comment. ■

nature research ACADEMIES



Training workshops for researchers

A series of workshops to support researchers, covering topics such as getting published, journal editing, clinical research methodology, and applying for research positions.

Visit partnerships.nature.com/academies to host an academy at your institution.