



Chinese officers destroy seized drugs.

XINHUA NEWS AGENCY/SHUTTERSTOCK

of drugs seized by police, and user surveys. A 2016 study in eight European cities found a strong correlation between the amount of cocaine detected in waste water and data from drug seizures (J. A. Baz-Lomba *et al.* *BMC Public Health* **16**, 1035; 2016). However, in the case of metamphetamines, the correlation was not as strong.

Researchers around the world generally agree that WBE can reliably estimate drug use, says Shane Neilson, the head of Determination for High Risk and Emerging Drugs at the Australian Criminal Intelligence Commission in Canberra. "The science and findings are

globally consistent and comparable," he says. The technique is also used by health researchers to detect other substances excreted by humans, such as signs of bacteria and viruses.

Zhang Lei, an environmental policy researcher at Renmin University in Beijing who collaborates with Li, notes that WBE studies are a more objective way of measuring whether government initiatives to reduce drug use in the community are working. She says that relying solely on conventional methods for monitoring changes in drug use, such as the number of arrests of users or the number of drugs being seized by police, can be misleading

because they are indirect measures. "WBE offers an unequivocal measure of the effectiveness of efforts," says Zhang.

Li and his team put this to the test when they measured two popular synthetic drugs, methamphetamine and ketamine, in waste water across China two years after local and national agencies launched campaigns to crack down on drug use and manufacturing in 2013. Zhang's team found that after these initiatives, methamphetamine use dropped by 42% and ketamine use decreased by 67%. Li thinks the drop in drug use is a result of police campaigns.

#### OTHER COUNTRIES

Jose Antonio Baz-Lomba, a researcher at the Norwegian Institute for Water Research in Oslo, says the growing evidence that the technology is a reliable measure of drug use should encourage other international police authorities to take WBE seriously and start collaborating with researchers.

But Carsten Prasse, an environmental-health researcher at Johns Hopkins University in Baltimore, Maryland, argues that cultural and political differences between countries will have a substantial effect on this research. "In China, the general population is used to following the directions given by the government, and privacy-related issues don't seem to be a major concern — the situation is totally different in the United States," he says.

Prasse says the potential implementation of wastewater-based drug monitoring needs to be discussed in the community, not only between scientists and law enforcement. "WBE represents a powerful new tool to assess drug consumption in our cities, but there is still a lot of work to do before it can be implemented on a larger scale," he says. ■

#### PUBLISHING

# Experimental open-access deal ends

Science's pilot contract with the Gates Foundation aimed to solve a policy conundrum that affects several journals.

BY RICHARD VAN NOORDEN

The publisher of *Science* last month ended a pilot partnership that allowed open-access (OA) publishing for researchers funded by the Bill & Melinda Gates Foundation.

The trial was an effort to accommodate a policy clash between the Gates Foundation, which has enforced strict OA demands since

2017, and publishers running subscription journals that don't comply with those terms. So far, 26 papers have been published in *Science* and 4 sister subscription journals as part of the 18-month experiment, and more might appear, says a spokesperson for *Science*'s publisher, the American Association for the Advancement of Science (AAAS) in Washington DC. Neither the Gates Foundation nor the AAAS commented on why the deal ended.

Under the contract, the Gates Foundation paid the AAAS a lump sum of around US\$100,000 for a trial first year, during which 16 papers appeared. The two organizations then extended their partnership for another six months, and continued their contract on "similar terms", but have agreed to keep the extra amount paid confidential, says Bryan Callahan, an external-relations officer at the Gates Foundation.

Meanwhile, two other influential journals, *The New England Journal of Medicine* (NEJM) and *Proceedings of the National Academy of Sciences* (PNAS), quietly changed their policies last year to offer a permanent OA publishing route for Gates grant holders. And although *Nature* has not made a specific agreement with funders, it has published some papers under OA terms, including two Gates-funded papers this year. (*Nature*'s news team is editorially independent of its journal team and of its publisher, Springer Nature.)

The Gates Foundation, based in Seattle, ▶

► Washington, is a global health charity that spent \$4.6 billion in 2016, much of it allocated to research. Each year, more than 2,000 papers are published from projects it funds. The foundation stipulates that these papers, and their data, must be made open.

It's not the only research funder to have such rules, but its policy is stricter than most, because it demands that papers are made free to read immediately on publication, rather than permitting a six-month delay as some subscription journals require. And the papers must not only be free to read, but also be posted under a 'CC-BY' licence that allows their contents to be reused without restrictions, for example through republication, even for commercial purposes. When the Gates policy came into force at the beginning of 2017, it clashed with the rules of subscription journals including *Nature*, *Science*, *NEJM* and *PNAS*, meaning that researchers could not publish Gates-funded work in these journals.

In February that year, however, the AAAS and Gates announced their partnership. On 1 March, *NEJM* changed its own policy. The medical journal generally makes articles free to read on its website six months after publication, but it agreed to make Gates-funded

articles free to read immediately, says Jennifer Zeiss, communications and media-relations manager for the NEJM Group. It also agreed to simultaneously make available a CC-BY licensed 'author final version' of the paper, which includes revisions made after peer review but lacks final *NEJM* editing. These appear online in the PubMed Central database. "At present time, *NEJM* does not have this arrangement with other funders," Zeiss says.

And in September 2017, *PNAS* — which also already makes papers free to read on its site six months after publication — began offering an OA option under a restrictive licence that does not permit commercial reuse or republication. The journal also decided to offer a liberal CC-BY licence for authors whose funders mandate it, a spokesperson says.

*Nature* does not have a specific OA policy for Gates grant holders, but the issue is still under discussion, and the journal does occasionally publish papers, which can include those with Gates funding, under a CC licence,

**"If Gates had refused to pay the prestige tax, it would not have lost grant applications."**

says a spokesperson for Nature Research, the portfolio of journals that includes *Nature*. The journal has published more than 30 CC-BY OA papers since 2017, according to an analysis by *Nature*'s news team, including the two by Gates-funded researchers.

Peter Suber, director of the Harvard Open Access Project and the Harvard Office for Scholarly Communication in Cambridge, Massachusetts, characterizes the AAAS pilot as a compromise whereby Gates paid the publisher a "prestige tax" for the specific OA terms it wanted.

"To me, the deal was unnecessary and undesirable. A wide range of high-quality journals were already compatible with the Gates publishing terms. If Gates had refused to pay the AAAS prestige tax, it would not have lost grant applications from first-rate researchers," Suber says. "I'm glad to see it come to an end."

Other funders haven't imposed terms as stringent as Gates's, notes Stephen Curry, a structural biologist at Imperial College London, but he praises the stance. "Gates are right to stipulate immediate OA as a condition of funding, especially in an area of such importance to global public health." ■

## ASTRONOMY

# Ten new moons spotted orbiting Jupiter

Planet now has 79 known satellites, including one on a collision course with its neighbours.

BY ALEXANDRA WITZE

ASTRONOMERS have discovered 10 small moons orbiting Jupiter, bringing its total to 79 — by far the most moons known around any planet. One of the finds is an oddball that moves in the opposite direction from its neighbours.

Together, the moons help to illuminate the Solar System's early history. The existence of so many small satellites suggests

that they arose from cosmic collisions after Jupiter itself formed, more than 4 billion years ago.

"They did not form with the planet, but were likely captured by the planet during or just after the planet-formation epoch," says Scott Sheppard, an astronomer at the Carnegie Institution for Science in Washington DC. He and his colleagues announced the discovery on 17 July.

Sheppard's team typically hunts for objects

in the very distant Solar System, out beyond Pluto, and sometimes spots planetary moons during these searches. Last year, the group reported two additional Jovian moons. In this case, the scientists were looking for a putative unseen massive planet popularly known as Planet Nine. Jupiter was in the same part of the sky, so they were able to hunt for moons as well.

To discover new Solar System bodies and calculate their orbits, the researchers

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