

► is not the same as what we're studying today," says Ruth Etzel, a paediatrician on leave from the EPA who specializes in children's environmental health. "We have to study children now, in their communities."

Many environmental-health researchers see the EPA's decision to cut funding for the children's centres as part of a push by President Donald Trump's administration to undermine science at the agency, which is responsible for the safety of US air and water.

"It works out perfectly for industry," says Tracey Woodruff, who runs the children's centre at the University of California, San Francisco. When weighing the harms of a chemical against its benefits, she says, "if EPA doesn't know, it counts for zero".

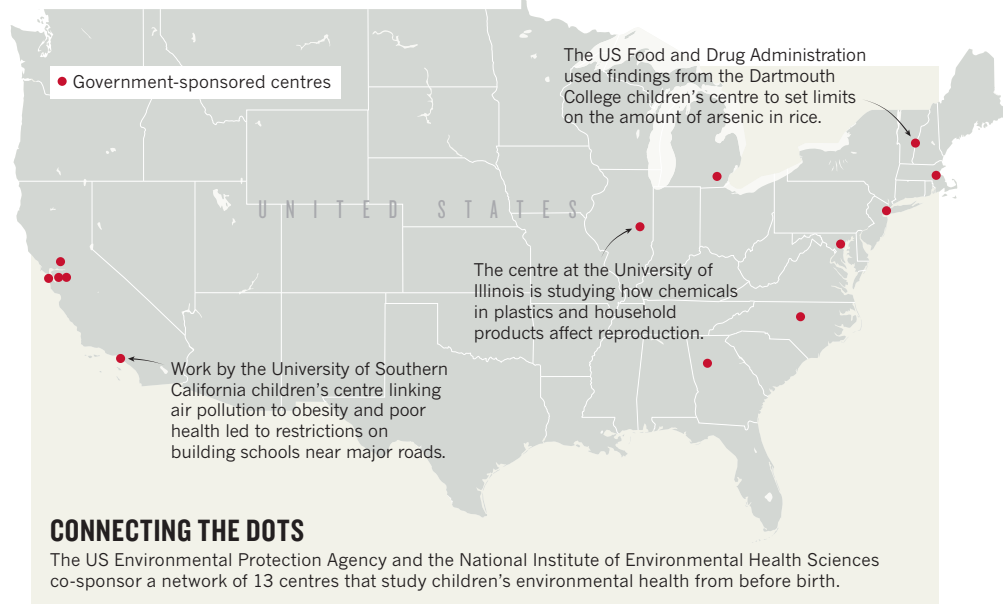
The EPA did not respond to multiple requests for comment on its plans for the children's centres or its work on children's environmental health more generally.

### HIDDEN LINKS

The 13 facilities supported by the EPA and the NIEHS are scattered in cities across the country and employ hundreds of researchers in disciplines such as toxicology, genetics and brain development (see 'Connecting the dots'). The centres' ability to follow people from before birth to adulthood has revealed surprising connections between common chemicals and health.

Research by the Columbia centre suggests that the widely used pesticide chlorpyrifos harms the development of children's brains. Chlorpyrifos is used to treat a broad array of food crops, and until 2001, it was legal in the United States for use indoors against insects such as cockroaches. In 2012, Columbia scientists reported that children who were exposed to high levels of the pesticide in the womb had lower IQs and altered brain structure compared to those with low exposure (V. A. Rauh *et al. Proc. Natl. Acad. Sci. USA* **109**, 7871–7876; 2012).

Last year, Hawaii became the first US state to ban agricultural use of chlorpyrifos — and



### CONNECTING THE DOTS

The US Environmental Protection Agency and the National Institute of Environmental Health Sciences co-sponsor a network of 13 centres that study children's environmental health from before birth.

cited the Columbia research. The centre's work is also at the heart of an ongoing lawsuit brought by environmental groups seeking to force the EPA to ban all uses of the pesticide.

"They're just jaw-dropping studies," says Lisa Satterwhite, a molecular geneticist with the children's centre at Duke University in Durham, North Carolina. "We could not have anticipated there would be this built-in natural experiment."

Each of the facilities also works with local groups to educate communities about the findings of their studies, many of which address environmental harms that disproportionately affect people in low-income neighbourhoods. "I cannot think of an equivalent network that could do the same work," says Aparna Bole, a paediatrician at Rainbow Babies and Children's Hospital in Cleveland, Ohio.

After the children's centres' long-term grants from the EPA and the NIEHS expire, the facilities will have until July 2020 to spend the remainder of the money. The additional cash that the NIEHS has scraped together will allow some of the centres to perform outreach, graduate students to finish dissertations and

the centres to wind down many of their other activities.

But Kimberly Gray, who manages the NIEHS's contribution to the centres, says that her agency cannot afford to support them on its own without making significant changes.

For now, she says, the NIEHS is trying to maximize the research that the centres have already completed, by supporting their community outreach, and looking for ways to keep their study cohorts going. The centres are also eligible to compete for NIEHS grants against other long-term epidemiological studies of all types.

Linda McCauley, who leads the children's centre at Emory University in Atlanta, Georgia, is spending her remaining money on community outreach. Grants from the US National Institutes of Health — the NIEHS's parent — or other funders could help her continue to do research, but the outreach programme at her centre has no other source of financial support.

"All these community stakeholders have been such critical partners for this work nationally and there's no funding," she says. "They're the ones being hurt the most." ■

SOURCE: NIEHS

### GRANTS

# AI is selecting reviewers in China

The tool is already saving time for the country's major grant funding agency.

BY DAVID CYRANOSKI

China's largest funder of basic science is piloting an artificial intelligence (AI) tool that selects researchers to review grant applications, in an attempt to make the process more efficient, faster and fairer. Some researchers say the approach by the National

Natural Science Foundation of China (NSFC) is world-leading, but others are sceptical about whether AI can improve the process.

Choosing researchers to peer review project proposals or publications is time-consuming and prone to bias. Several academic publishers are experimenting with AI tools to select reviewers and carry out other tasks. And a few

funding agencies, including some in North America and Europe, have trialled simple AI systems, some of which match keywords in grant applications to those in publications of other scientists to identify potential reviewers.

The NSFC is building a more sophisticated system that will crawl online scientific-literature databases and scientists' personal

web pages, using natural-language processing to glean detailed information about the publications or research projects of potential referees. The system will use semantic analysis of the text to compare the grant application with this information and identify the best matches, says agency head Li Jinghai, who is based in Beijing.

An early version of the tool selected at least one member of each of nearly 44,000 panels that approved projects last year, says Yang Wei, the agency's former head, who presented data on the pilot at a meeting on scholarly communication in Hangzhou last month. Panels are composed of between three and seven people. The system is already cutting the time administrative staff have to spend looking for referees, says Yang. A similar approach will be used this year to select reviewers, he says.

The NSFC has become a world leader in reforming grant-review processes, says Patrick Nédellec, director of the international-cooperation department of the French CNRS, Europe's largest basic-research agency. The NSFC is being forced to innovate as the number of grant applications keeps growing, says Nédellec, who attended a meeting last September at which Li discussed the agency's reform plans. "Because the pressure is so high, China has no choice but to find the best way," he says.

In the past five years, the number of applications the NSFC receives has increased by roughly 10% a year. In 2018, the organization evaluated 225,000 grant applications — almost 6 times the number received by the US National

Science Foundation. The NSFC is struggling to process applications and find appropriate reviewers, says Li. "The challenge is not having enough people," he says. "AI will solve that."

Li also wants the tool to reduce bias in reviewer selection. In China, scientists try to lobby for their projects, he says. "AI can't be corrupted."

Bias can also be an issue in countries where applicants are asked to suggest experts who could review their proposals. The Swiss National Science Foundation has found that reviewers who were recommended by the applicants were more likely to endorse a project than were referees chosen by the foundation.

The NSFC's pilot AI system works on websites written in Chinese characters, but Li wants it to be able to crawl English-language sites in the future.

"NSFC's reform plan is ambitious, forward-looking and comprehensive," says Manfred Horvat, a science-policy adviser at the Vienna University of Technology, who also heard Li's talk last September.

Other countries are following China's lead. Last month, the Research Council of Norway started using natural-language processing to cluster about 3,000 proposals into groups and match them to the best reviewer panels, says

**"Because the pressure is so high, China had no choice but to find the best way."**

Thomas Hansteen, an adviser to the council.

But not everyone is convinced that AI should be used in the review process. Susan Guthrie, a science-policy specialist at research organization RAND Europe in Cambridge, UK, notes that the Canadian Institutes of Health Research has run into challenges with an algorithm used for reviewer selection.

The Canadian agency hired RAND Europe in 2016 to carry out a meta-analysis of studies on grant peer review. Partly on the basis of that report, the agency concluded that the algorithm sometimes selected reviewers who had conflicts of interest or were otherwise not qualified to evaluate the proposal. "While algorithm-based matching sounded attractive, there is a limit at this stage of artificial intelligence to what it can possibly achieve," an independent expert panel concluded.

Elizabeth Pier, a policy researcher at Education Analytics in Madison, Wisconsin, thinks AI will not remove selection bias. She fears that AI systems end up replicating the biases ingrained in human judgements, rather than avoiding them.

Li says that the NSFC also plans to introduce a credit system that will reward researchers for good, fair and timely reviews — although he wouldn't comment on the nature of the rewards.

But statistician John Ioannidis of Stanford University in California says it will be difficult to evaluate whether reviewers have made good decisions because it can take decades for an idea to be considered "great or a waste". ■

## POLITICS

# Extremism concerns Indian scientists ahead of election

*Researchers are also troubled by a flat budget and a rise in pseudoscience.*

BY T. V. PADMA

Rising intolerance towards intellectuals and minority groups in India has prompted scientists there to speak out ahead of the country's mammoth general election. More than 200 scientists have signed an open letter appealing to citizens to reject the discrimination and violence being promoted by some extremist groups.

The election is a contest between the ruling Hindu nationalist Bharatiya Janata Party (BJP), led by Prime Minister Narendra Modi, and the main opposition, the secular Indian National Congress — the Congress party. Nearly 900 million people are eligible to vote in this election, which began on 11 April and is

being held in several phases, ending on 19 May.

The letter, posted online last month, is an unusual move for India's research community, which rarely comments on political or social issues. It calls on voters to "reject those who lynch or assault people, those who discriminate against people because of religion, caste, gender, language or region".

The letter does not mention any political party. But since the BJP formed a government in 2014, there has been a rise in attacks by Hindu right-wing groups in India against Muslims and other minority groups that eat beef — Hindus consider cows sacred. Extreme right-wing groups were also blamed for the deaths of three intellectuals, between 2013 and 2015, who campaigned for scientific reasoning.

Against this backdrop of intolerance, some scientists say they also face flat investment in science and a rise in politicians and public figures making unscientific claims. The BJP includes new technology in its manifesto, but some worry that it prioritizes technology ahead of basic science. The Congress party has promised to boost spending on science, but there are doubts over whether it can deliver on this.

The BJP's election manifesto states that it will launch major programmes in artificial intelligence, robotics, supercomputers and genomics for human health, but the manifesto does not mention how much it will spend on these endeavours. Last year, Modi also announced a mission to send humans to space by 2022. ▶