XINHUA/AVALON.RED

Indian Prime Minister Narendra Modi at an election rally.

The proposal could improve technological capabilities and advance the country, says cell biologist Satyajit Mayor, director of the National Centre for Biological Sciences, Bangalore. But he fears that if these missions are pursued in lieu of promoting basic and fundamental science, that could weaken the country's scientific base.

The Congress party, meanwhile, has promised to raise science spending to 2% of the country's gross domestic product, up from between 0.7% and 0.8% over the past decade, a pledge that has been welcomed by some scientists, including Mayor.

But others are sceptical that the plan will pan out because the party has not explained where the money to fund it will come from. "BJP's plan seems to do better in trying to boost the economy through encouraging technology," says geneticist Tapasya Srivastava at Delhi University.

Irrespective of party promises, Amitabh Joshi, an evolutionary biologist at the Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore, would like to see a greater balance between investment in basic and applied research. In the biological sciences, for example, molecular and cell biology get vastly more money than ecology or evolution, he says. The imbalance runs through into the education system; there are no postgraduate courses in evolutionary biology offered at Indian universities, says Joshi.

As a consequence, scientists working on emerging infections such as dengue fever and Nipah virus, and on antimicrobial resistance, have limited training in evolution at the university level, which is important to understand how host–pathogen relationships evolve and pathogens develop drug resistance, says Joshi.

Neither the Congress party nor the BJP has addressed another concern for scientists in India: public figures promoting 'unscientific' ideas. The most recent case occurred at the 2019 Indian Science Congress in Jalandhar in January. Gollapalli Nageswara Rao, vice-chancellor of Andhra University in Visakhapatnam, cited an ancient Indian text as proof that knowledge of *in vitro* fertilization and stem cells existed in India thousands of years ago. Another speaker contested Einstein's theories of relativity.

Last year, a higher-education minister also questioned Charles Darwin's theory of evolution while talking to reporters. Indian scientists posted an online petition condemning the minister's statement.

"Those who care about science are certainly very distressed by the gratuitous claims of our politicians about pseudoscience without regard to any evidence," says Mayor.

All parties are guilty of talking pseudoscience, says physicist Gautam Menon at the Institute of Mathematical Sciences, Chennai. But he says the party in power carries special responsibility because its words and actions will determine policy. He cites the government's push in 2016 for research on the health and other benefits of a combination of cow products called *panchgavya*, which have not been scientifically validated. As a result, individual research institutes started projects on cow products, and science minister Harsh Vardhan set up a panel to carry out research to validate the products' benefits. "This spending is only for ideological reasons," says Menon. ■

BIOMEDICAL RESEARCH

Brazil's science faces reproducibility test

More than 60 labs will assess the replicability of work by the country's researchers.

BY RODRIGO DE OLIVEIRA ANDRADE

An ambitious project to test the reproducibility of biomedical experiments by Brazilian scientists is about to get under way.

The Brazilian Reproducibility Initiative was launched last year by researchers at the Federal University of Rio de Janeiro (UFRJ). Now, the first wave of reproducibility testing is set to begin in August, with help from more than 60 laboratories scattered between 43 Brazilian research centres.

The project is one of the first to test the reproducibility of scientific research from a particular country, instead of a particular field.

Participants will attempt to replicate up to 100 biomedical experiments — with each experiment tested by 3 labs (O. B. Amaral *et al. eLife* **8**, e41602; 2019). The team decided to take that approach, rather than trying to reproduce full studies, to broaden its coverage of the published literature and to make it easier for volunteers to participate, says project coordinator Olavo Bohrer Amaral, a physician at the UFRJ Institute of Medical Biochemistry.

"We intend to systematically assess the reproducibility of biomedical research, covering different areas of life-science research in Brazil in an open, unbiased and transparent way," he says.

To determine which experiments to test, the project's leaders examined 30,000 biomedical articles published over the past two decades. They narrowed this list down by identifying 5,000 papers in which most authors were at a Brazilian institution.

From this set of studies, the team drew up a list of ten analytical methods commonly used in Brazil — including the MTT assay to assess cells' metabolic activity, RT-PCR to amplify and detect specific genetic sequences, and the elevated plus maze to test rodent behaviour. The researchers then randomly chose

experiments for replication that use one of these techniques.

Amaral and his team expect to finish the project by 2021, with funding from the Serrapilheira Institute in Rio de Janeiro — Brazil's first private organization dedicated to supporting basic research in the natural sciences, computer sciences, engineering and mathematics. An initial 145,000-Brazilian-real (US$37,000) grant allowed the scientists to establish the project's general methodology, select experiments to analyse, and build a network of collaborators.

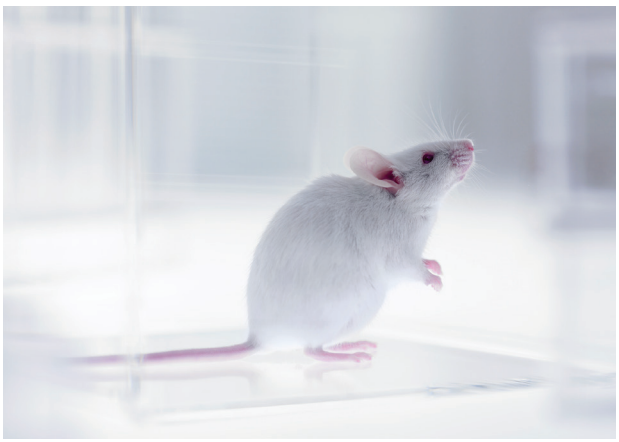
Now the project is working with participating labs to establish protocols for replication attempts, with the help of another 1,000,000-real grant from the institute, awarded in January.

The Brazilian project follows in the footsteps of several attempts to replicate scientific outcomes on a large scale. One of the first was the Reproducibility Project: Psychology, which launched in 2011. It gathered 270 scientists to replicate the results of 100 psychology articles in different journals, yielding a reproducibility rate of 36–47%. Similar initiatives in experimental economics, philosophy and social sciences arrived at replication rates ranging between 57% and 78%.

The effort's leaders hope that it will reveal ways to predict the reproducibility of scientific studies. "It might be invaluable for future decisions on how to finance and elevate science in Brazil," says Roger Chammas, an oncologist at the University of São Paulo School of Medicine and coordinator of one of the replicating labs.

Daniel Martins-de-Souza, a biochemist at the University of Campinas in Brazil, agrees. "If the project moves forward, it may aid defining which types of studies or methods have more potential to obtain new possibilities of therapy against diseases," he says. "It could guide the decision-making process of funding agencies."

Others are more sceptical. Lygia da Veiga Pereira, a geneticist at the University of São Paulo, says it is too early to tell whether the project's findings will be able to help guide future research. Still, she says, "testing how much of Brazilian science is reproducible will be a good diagnosis for us". ■



ADAM GAULT/GETTY

Mouse-behaviour tests are among the experiments being replicated.

GENETICS

Russia joins global gene-editing bonanza

A US$1.7-billion programme aims to develop 30 gene-edited plant and animal varieties.

BY OLGA DOBROVIDOVA

Russia is embracing gene-editing. A 111-billion-rouble (US$1.7-billion) federal programme aims to create 10 new varieties of gene-edited crops and animals by 2020 — and another 20 by 2027.

Alexey Kochetov, director of the Siberian Branch of the Russian Academy of Sciences (RAS) Institute of Cytology and Genetics in Novosibirsk, welcomed the research programme, noting that genetics in Russia has been "chronically underfinanced" for decades.

Funding for science plummeted in the 1990s following the break-up of the Soviet Union, and Russia still lags behind other major powers: in 2017, it spent 1.11% of its gross domestic product on research, compared with 2.13% in China and 2.79% in the United States.

But some researchers doubt that the goals can be met on time, and worry that the initiative does not address the other issues they face, such as excessive bureaucracy.

It is also not clear whether the 111 billion roubles is included in the existing federal civilian-science budget — which in 2018 was 364 billion roubles, with 22 billion roubles spent on genetics research — or whether it comes in addition to that budget.

The programme, announced in April, has also attracted interest because it suggests that some gene-edited products will now be exempt from a law passed in 2016 that prohibits the cultivation of genetically modified (GM) organisms in Russia, except for research purposes. Previously, it was not clear whether gene-edited organisms were included in the ban.

"Russia is highly dependent on imports when it comes to elite crop varieties."

The 2016 law describes GM organisms as those with gene modifications "that cannot result from natural processes". But the decree that established the new programme describes gene-editing technologies such as CRISPR–Cas9 — which do not necessarily insert foreign DNA — as equivalent to conventional breeding methods.

That marks a welcome step for Russian researchers, many of whom were demotivated by the uncertainty of the 2016 ban, according to a scientist at a major institute of the RAS in Moscow who asked to remain anonymous for fear of professional repercussions.

The wording of the decree chimes with the stance of the US agriculture department, which last year said that it has no plans to regulate "plants that could otherwise have been developed through traditional breeding techniques", including gene-edited species — although the US situation is less clear with regard to animals, which the Food and Drug Administration oversees.

By contrast, a July 2018 ruling from the European Union's highest court declared that gene-edited crops are subject to the same tough regulations as conventional GM organisms — something many scientists said would hamper research.

Konstantin Severinov, a molecular geneticist who helped to develop the Russian programme, told *Nature* it is important that Russia is not sidelined in the world's "CRISPR bonanza", and that one goal of the programme is to make Russia less reliant on crops from other countries.

"Russia is highly dependent on imports ▶