

FUNDING

Germany's plans to promote research excellence criticized

Critics say selection process for high-stakes funding programme is flawed.

BY QUIRIN SCHIERMEIER

Germany's latest programme to boost research at its universities and make them more competitive internationally risks missing its goals, according to observers.

The Excellence Initiative was launched in 2005 with €4.6 billion (US\$5.4 billion) in funding and the aim of creating a handful of elite universities. Researchers across Germany are now preparing for the programme's next round, dubbed the Excellence Strategy, which starts in 2019.

Earlier this year, almost 200 groups of scientists submitted proposals to form Clusters of Excellence — large collaborations of research groups at one or more universities that form the core element of the strategy. And last month, an international committee invited 88 of the groups to submit full project proposals by late February. Up to 50 such clusters will from 2019 receive top-up funding of about €8 million per year for seven years.

But observers question whether the 88 selected projects represent Germany's best science, particularly because the focus for selection has shifted away from basic science and towards applied research. Unsuccessful applicants say that the rules for submitting proposals for the initiative were not clearly defined and communicated. Several high-profile groups came away empty-handed, including biology



Peter Strohschneider, president of the DFG.

teams in Frankfurt, Heidelberg and Munich involving dozens of scientists funded by the prestigious European Research Council.

"The Excellence Initiative has brought German science some welcome structural change," says Dieter Imboden, a Swiss environmental physicist who chaired a 2016 review of the initiative. "But its achievements must not obscure the view of its flaws."

The competition to form clusters should be run independently of that for elite-university status, he says. Otherwise, second-tier universities could outperform those with a much

stronger overall research portfolio and gain the sought-after title, which is currently held by 11 universities.

Critics also say that the geographic spread of positively reviewed applications for future excellence clusters — across 41 universities in 13 of Germany's 16 states — hints at a political desire to distribute the funds more evenly across the country.

But Peter Strohschneider, president of Germany's main research-funding agency, the DFG, which runs the programme, says the selection panels chose the projects strictly on the basis of scientific quality, without any regional or political considerations. Scientists will figure strongly on the Excellence Commission, which will make the final selection in September 2018 and will also include federal and state science ministers, he says.

Until 2005, responsibility for funding universities in Germany lay exclusively with the states. The Excellence Initiative was created to allow central government to inject federal money into research, a move now guaranteed by a change to the German constitution. But many say the changes have not gone far enough.

"The initiative has quite lost sight of its goal," says a former president of a large German university, speaking on condition of anonymity. "Universities here remain trapped in a federal political system that is unable to create a powerhouse like Yale or Harvard." ■

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GENETICS

How evolution has shaped mental illness

Genetic studies reveal the influence of past environments.

BY SARA REARDON

Psychiatric disorders can be debilitating and they often involve a genetic component, yet evolution hasn't weeded them out. Now, research is beginning to reveal the role of natural selection — offering a peek at how the genetic underpinnings of mental

illness have changed over time.

Many psychiatric disorders are polygenic: they can involve hundreds or thousands of genes and DNA mutations. It can be difficult to track how so many genetic regions evolved, and studies of this sort require large genome data sets. The advent of massive human genome databases is enabling researchers to look for

possible connections between mental illnesses and the environmental and societal conditions that might have driven their emergence and development. Others are looking to Neanderthal genetic sequences to understand these disorders, as well as cognitive abilities, in humans. Several teams presented their findings at the American Society of Human Genetics meeting in Orlando, Florida, in late October.

One project found that evolution selected for DNA variants thought to protect against schizophrenia. The study, led by population geneticist Barbara Stranger of the University of Chicago in Illinois, looked at hundreds of thousands of human genomes using a statistical method that identified signals of selection over the past 2,000 years (Y. Field *et al. Science* **354**, 760–764; 2016). There were no signs of selection in genetic areas associated with ►

▶ any other mental illness.

Despite selection for protection against schizophrenia, the condition has persisted — but it's unclear why. Many of schizophrenia's symptoms, such as experiencing auditory hallucinations and jumbling sentences, involve brain regions tied to speech, says Bernard Crespi, an evolutionary biologist at Simon Fraser University in Burnaby, Canada. Over the course of hominid evolution, he says, the benefits of the ability to speak could have outweighed the tiny risk that the genes involved in language could malfunction and result in schizophrenia in a small percentage of the population.

Another team, led by human geneticist Renato Polimanti at Yale University in New Haven, Connecticut, is trying to tease out links between environmental factors, mental illnesses and behavioural traits. Polimanti and his colleagues looked at 2,455 DNA samples from individuals at 23 sites across Europe. They quantified each person's overall genetic likelihood of conditions, such as autism, and personality traits, such as extraversion. Then, the scientists calculated whether that risk was associated with certain environmental factors, such as rainfall, winter temperatures or the

prevalence of infectious disease — exploring the idea that these factors might have been involved in selecting for the human traits.

People in parts of Europe with relatively lower winter temperatures, they found, were slightly more genetically prone to schizophrenia. Polimanti suggests that if genes that helped people to tolerate cold lay close to variants that promoted schizophrenia, then schizophrenia-related genes could have been inadvertently carried along during evolution as “fellow travellers”.

“This was a nice first attempt to put some environmental context” on the genetic variants associated with mental illness, says Tony Capra, an evolutionary geneticist at Vanderbilt University in Nashville, Tennessee. Polimanti plans to repeat the study in other regions.

FOR AND AGAINST

Untangling the roles of genetics and the environment will be difficult, however, because unknown environmental conditions in the past could have selected for traits that were advantageous then, but are considered negative today. Other evolutionary factors could have had indirect effects. An overactive immune system is thought to be involved in disorders such as depression, but a stronger immune

system would have made human ancestors more resistant to diseases, says Stranger.

Some researchers are exploring the evolution of mental illness by looking at possible differences in gene activity in tissues of Neanderthals and humans. A group led by Capra and Vanderbilt geneticist Laura Colbran used modern-human-genome databases to find DNA markers that suggest a gene is differently regulated in various tissues in the body. They then looked for these markers in two Neanderthal genomes. The team found that genes associated with neurological development were regulated differently in the Neanderthal brain and the human brain.

The results could eventually lead to a better understanding of how Neanderthal brains functioned compared with human brains, and whether they might have experienced similar psychiatric disorders.

Studying how mental illness evolved is still in its early stages, but the ability to use massive human-genome databases is an exciting step forward, says Capra. He and his colleagues will take advantage of this by surveying genetic areas that differ between Neanderthals and humans, and searching for differences in how the genes are expressed. ■

SOCIETY

Turmoil hits science march

A group of volunteers claims that the organization that spearheaded global protests in April has been unduly secretive about its management practices.

BY EMMA MARRIS

The US group that sparked the global March for Science movement is facing complaints about its management practices as it files for non-profit status and signals its intent to continue as “a movement to advance science and its role in public life”.

On 23 October, a group of current and former volunteers released an open letter to the central March for Science organization in New York City, alleging that it is secretive, insensitive to the concerns of its volunteers and unwilling to share power or information with organizers of its many affiliated ‘satellite’ groups around the world.

In a statement to *Nature*, the March for Science said that it welcomed the “concrete feedback and suggestions”. But volunteers have already walked away from the organization, and at least one major satellite group, in New York, has severed ties. The turmoil comes at a time of renewed political activism



AARON P. BERNSTEIN/REUTERS

Participants gather at the March for Science in Washington DC on 22 April.