the set threshold, the non-profit organization should ensure that all experiments were halted and should communicate the issue to the agency, which was not done. This led the HHS to conclude that the research "likely violated protocols of the NIH regarding biosafety".

An EcoHealth spokesperson denied that it had violated the terms of the grant, given that the experiments did not rise to a level that would be considered significant enough to report as unusual. Regarding the delay in submitting the report, the spokesperson said that EcoHealth had made every effort to file the report on time, but had been "stymied by contradictory advice from NIH grant management officials, and an online system [for submitting the report] that is confusing and error-prone, leading to multiple instances where the system locked us out".

The HHS memo says that, according to a forensic audit performed by the NIH, EcoHealth was never locked out of the system.

Federal auditors have cited the NIH for not pursuing the late report and recommended that the agency intensify its monitoring of foreign institutions that receive NIH funds.

Addressing the HHS's allegation that EcoHealth had failed to respond adequately to the NIH's requests for information and materials related to the WIV's research, the spokesperson said that, given the geopolitical pressure on US–China relations during the pandemic and the fact that the HHS, the World Health Organization (WHO) and the intelligence community had all been unable to get evidential information from the WIV, "it is outrageous to propose this as grounds to debar our organization".

Questions of oversight

Amesh Adalja, an infectious-disease specialist at the Johns Hopkins Center for Health Security in Baltimore, Maryland, says that any grant recipient is expected to comply with a series of conditions – which include submitting reports in a timely fashion and overseeing partner institutions – and that the HHS memo seems to indicate that EcoHealth did not fully meet those standards. "There's enough listed there to call into question what type of stewardship was going on with that taxpayer money," he says.

EcoHealth Alliance has played an important part in illuminating scientists' understanding of emerging viruses, Gostin says. In addition to conducting coronavirus surveillance in wildlife, the group has studied the spillover of Nipah virus and other pathogens to humans. He worries that the suspension could disincentivize research aimed at pandemic preparedness and prevention that's being done in partnership with other countries.

The next pandemic could easily arise in a country that trades wild animals, such as China, so the type of research and surveillance that EcoHealth does is important, Gostin says. Before the suspension, EcoHealth had three active NIH-funded grants supporting efforts to study the risk of emerging viruses in countries such as Bangladesh, Myanmar and Vietnam. Since 2008, it has been awarded a total of US$90.3 million in federal funding, $19.59 million of which was from the HHS.

Additional reporting by Max Kozlov.

THE ORIGIN OF A PEST: HOW THE COCKROACH CONQUERED THE WORLD

Genomic analysis suggests cockroaches reached the world from Europe, but weren't from there originally.

By Bianca Nogrady

A ubiquitous household pest has unexpected origins. A cockroach that lives in human dwellings all over the world is known as the German cockroach – but it did not originate in Germany. A study published last week in the *Proceedings of the National Academy of Sciences* suggests that the creature originated in South Asia and spread globally because of its affinity for human habitats (Q. Tang *et al. Proc. Natl Acad. Sci. USA* **121**, e2401185121; 2024).

Swedish biologist Carl Linnaeus was the first scientist to describe the cockroach – which he named *Blattella germanica* – in 1776 in Europe, hence the assumption about its German origins. "They did not originate from there, but they were domesticated there and then started to spread across the world," says study co-author Qian Tang, an evolutionary biologist now at Harvard University in Boston, Massachusetts.

Tang and his colleagues analysed the genomes of 281 German cockroaches collected from 17 countries, including Australia, Ethiopia, Indonesia, Ukraine and the United States. They used the similarities and differences between the genomes to calculate when and where different populations might have been established.

The authors found that the closest living relative of the German cockroach is probably the Asian cockroach *Blattella asahinai*, which is still found in South Asia. *Blattella germanica* probably split off from it around 2,100 years ago.

Then, around 1,200 years ago, *B. germanica* hitchhiked west into the Middle East with the commercial and military traffic of the Islamic Umayyad and Abbasid caliphates. It began to spread east from South Asia around 390 years ago, with the rise of European colonialism and the emergence of international trading firms

MARTIN DOHRN/SPL

The German cockroach (*Blattella germanica*) is found all over the globe.

such as the Dutch and British East India Companies. Around a century later, the German cockroach hitched a ride into Europe, and from there spread around the world.

Cleo Bertelsmeier, a researcher of invasive species at the University of Lausanne in Switzerland, says it was exciting to see how the study was able to map the genetic data to historical events. The use of genomics was essential to understanding the dispersal of the German cockroach, because "this is already quite an ancient invasion, they became so abundant that there is no way, without such tools, to know that this is not a native species from Europe", she says.

German cockroaches owe their success to their extraordinary adaptability, says Franz Essl, an ecologist at the University of Vienna. They readily adapt to highly modified environments, such as human-occupied niches; they have a short reproductive cycle; and they are very opportunistic, qualities that "also make them prone to be transported as hitchhikers to new places", says Essl. "That's a perfect combination of ingredients for making a species very successful in a human-shaped world."

'EPIGENETIC' CELL RESET PAVES THE WAY FOR LAB-GROWN SPERM AND EGGS

Technique wipes away tags on DNA that must be reprogrammed as reproductive cells develop.

By Heidi Ledford

The day when human sperm and eggs can be grown in the laboratory has inched a step closer, with the discovery of a way to recreate a crucial developmental step in a dish.

The advance, described on 20 May in *Nature*, addresses a major hurdle: how to ensure that the chemical tags on the DNA and associated proteins in artificially produced sperm and eggs are placed properly. These tags are part of a cell's 'epigenome' and can influence whether genes are turned on or off. The epigenome changes over a person's lifetime; during the development of cells that will give rise to sperm or eggs, these marks must be wiped clean and then reset to their original state.

Eggs in a dish

"Epigenetic reprogramming is key to making the next generation," says Mitinori Saitou, a stem-cell biologist at Kyoto University in Japan, and a co-author of the paper (Y. Murase *et al. Nature* https://doi.org/mxhw; 2024). He and his team worked out how to activate this reprogramming — one of the biggest challenges in generating human sperm and eggs in the laboratory, he says.

But Saitou is quick to note that his lab's epigenetic reprogramming is not perfect.

"There is still much work to be done and considerable time required to address these challenges," agrees Fan Guo, a reproductive epigeneticist at the Chinese Academy of Sciences Institute of Zoology in Beijing.

Growing human sperm and eggs in the lab would offer hope to some couples struggling with infertility. It would also provide a way to edit disease-causing DNA sequences in sperm and eggs, sidestepping some technical complications of making such edits in embryos. But in addition to its technical difficulty, growing eggs and sperm in a dish — called *in vitro* gametogenesis — would carry weighty social and ethical questions. Allowing genetic modification to prevent diseases, for example, could lead to genetic enhancement to boost traits associated with intelligence or athleticism.

Epigenetic reprogramming is key to the formation of reproductive cells — without it, the primordial cells that give rise to sperm and eggs stop developing. Furthermore, the epigenome affects gene activity, helping cells with identical DNA sequences to take on unique identities. Researchers know how to grow mouse eggs and sperm using stem-cell-like cells made from skin. But the protocols used don't work in human cells. "There is a big gap between mice and humans," says Saitou.

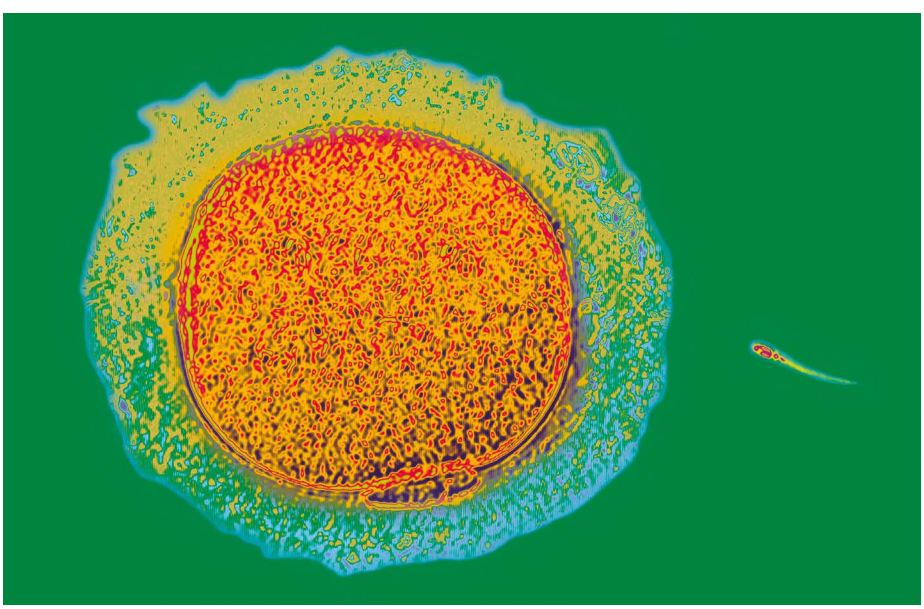
Pressing reset on the epigenome

Saitou and his colleagues began to search for a way to control epigenetic reprogramming in human cells. They found that a protein called BMP2 was essential for this step and that adding it to their cultures promoted epigenetic reprogramming. The cells grown in this culture progressed further in their development than did cells in cultures without added BMP2.

After epigenetic reprogramming, the cells' development halted again. But each step towards *in vitro* gametogenesis holds "immense significance", says Guo. Saitou's team is seeking to nudge the cells further along the path to becoming sperm and eggs.

The researchers carefully analysed epigenetic marks in their lab-grown cells and found that although many of the imprints had been wiped away, a few remained. This means that the reprogramming might be incomplete — which could have serious consequences if such cells were used for reproduction, potentially leading to disease, says Saitou.

Such caveats are important, he says: these results, along with other developments in the past few years, could fuel speculation and false claims that a solution is just around the corner. "I think in maybe five years or so, things will get more settled," he says. "And then only the good science will remain."



A sperm cell (right) swims towards a human egg (artificially coloured).

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