Prestigious award for two U.S. social scientists

Max Planck-Humboldt Research Award and Max Planck-Humboldt Medal presented in Berlin

Ufuk Akcigit from the University of Chicago is the winner of this year's Max Planck-Humboldt Research Award. The social scientist received the honor for his outstanding contributions in the field of macroeconomics. Among other things, he has demonstrated clear relationships between innovation and long-term economic growth, as well as between innovation and social mobility. The award is linked to a research residency in Germany, which Akcigit will spend at the Halle Institute for Economic Research (IWH). There, he wants to study the causes of economic disparities between East and West Germany. Elliot Tucker-Drob from the University of Texas in Austin received the Max Planck-Humboldt Medal for his services to the field of personality and developmental psychology. He studies how social and biological processes shape the psychological development of individuals over their entire lifespan. The awards were presented by Michael Meister, Parliamentary State Secretary at the Federal Ministry of Education and Research, Max Planck President Martin Stratmann and Hans-Christian Pape, President of the Alexander von Humboldt Foundation, as part of the Berlin Science Week in November 2019.

Newly honored: Ufuk Akcigit and Elliot Tucker-Drob (from left) at the awards ceremony in Berlin.

"Oscars of Science" for Max Planck researchers

Two of the lucrative Breakthrough Prizes have been awarded to Franz-Ulrich Hartl and the Event Horizon Collaboration

Franz-Ulrich Hartl, Director at the Max Planck Institute of Biochemistry in Martinsried and his American colleague Arthur L. Horwich are two of the winners of the Breakthrough Prize in Life Sciences 2020. The researchers were honored for discovering functions of molecular chaperones in mediating protein folding and preventing protein aggregation. In the 1980s, they demonstrated that – contrary to the general dogma – most proteins need assistance from so-called molecular chaperones in order to fold into the correct shape. Misfolded proteins clump together and are one of the main causes of severe neurodegenerative disorders such as Alzheimer's or Parkinson's disease. The Breakthrough Prize in Fundamental Physics was awarded to the Event Horizon Collaboration. With eight sensitive radiotelescopes strategically positioned around the world, this international consortium of 60 institutions has captured an image of a black hole for the first time. The Max Planck Institute for Radio Astronomy in Bonn and the Institute for Radio Astronomy in the Millimeter Range (IRAM) played a preeminent role in these efforts. The Breakthrough Prize is awarded annually in three categories, each of which has a prize money of 3 million U.S. dollars and is therefore worth more than any other scientific award.

Artistic trophy: the winners of the Breakthrough Prize are awarded a sculpture from the Danish artist Ólafur Elíasson.

Photos: David Ausserhofer (top); Breakthrough Prize Foundation

"There is no reason for germline therapy"

Stefan Mundlos, from the Max Planck Institute for Molecular Genetics, explains why there will be no "designer babies" in the near future

It was only when the first genetically modified children were born in China in 2018 that many people realized how far-reaching the capabilities of genome editing actually are. This method allows researchers to sever DNA at a precise location and therefore to switch genes off or insert new fragments. But the genome editing of cells from the human germline raises a plethora of scientific and ethical issues. In 2019, the Ethics Council of the Max Planck Society prepared a detailed discussion paper on genome editing, in which Stefan Mundlos of the Max Planck Institute for Molecular Genetics in Berlin discusses the risks and opportunities of this method for the world of medicine. The researcher, who also uses the CRISPR/Cas9 technique in his own work, believes that concerns over uncontrolled manipulation of the human genome are unfounded.

Professor Mundlos, is the modification of human cells ethically justifiable?
Stefan Mundlos: It depends whether we are talking about normal body cells – the somatic cells as they are known – or about germline cells: sperm and egg cells. Somatic cells do not pass on their genetic material. If the genome of these cells is modified, the mutation disappears with the death of the patient. Such an intervention for the treatment of hereditary conditions or cancer is comparable to other cell-based therapies and is therefore ethically unproblematic.

What about germline genome editing?
That's completely different. The task of sperm and egg cells is to provide offspring, and so they pass on their genetic material to the next generation. Manipulating the germline will therefore affect people who are not yet born at the time of modification and cannot give their consent. That's ethically unacceptable. As genome editing is also not yet precise enough to avoid causing unintended mutations, the Max Planck Society took a clear stand against interventions in the germline in its discussion paper on genome editing.

How safe is the technique then?
CRISPR/Cas9 does work very precisely and almost always cuts the DNA at a defined point. But despite that, mistakes can happen. Researchers are currently working on even more exact and less error-prone variations of the technique. In any case, we will always have to check whether modified cells do indeed only carry the desired mutations.

What significance will genome editing in humans have in the future?
The modification of normal body cells definitely has great medical potential. Conditions that are caused by one – or a few – mutations, such as some forms of leukemia, could be treated this way. I'm sure that we'll be able to treat the first patients using this method in just a few years. On the other hand, I don't see any need for germline gene therapy, since there are equivalent and ethically less problematic alternatives. Using in vitro fertilization and pre-implantation diagnostics, embryos free of adverse mutations can be selected for implantation.

Many people fear that genome editing will be used not just for treating illnesses, but also to optimize human characteristics. In the future, will we have particularly intelligent or tall "designer babies" thanks to this new technique?
I don't see any danger of this happening in the foreseeable future. Characteristics such as intelligence, height or other characteristics we might wish to optimize are influenced by many different genes. We are far from even understanding these gene networks, let alone being able to manipulate them. It's quite possible that doing so will be completely impossible without triggering undesired effects elsewhere.

Stefan Mundlos

Some scientists are demanding a moratorium, a voluntary commitment to refrain from carrying out any modification of the human germline. What you think about that?
I don't believe such a moratorium would be effective. The circle of scientists who can implement the technology is too wide for that. There will always be someone, somewhere in the world, who doesn't feel bound by the moratorium. And in any case, who would be responsible for policing it?

Is there no stopping the manipulation of the human genome then?
I'm convinced that the lack of benefit will be much more effective than bans or voluntary commitments regarding germline gene therapy. There would be no reason and therefore no "market" for it.

Interview: Harald Rösch

Photo: Edgar Zippel/MPG

Quantum tricks at the push of a button

Max Planck – New York City Center for Non-equilibrium Quantum Phenomena inaugurated in New York City

At the official opening: Max Planck Vice President Ferdi Schüth (center) with Graham Michael Purdy from Columbia University, James Simons from the Simons Foundation, and Maya Tolstoy and Mary C. Boyce, both from Columbia University (from left).

The new Max Planck Center will see the Max Planck Institute for the Structure and Dynamics of Matter and for Polymer Research join forces with Columbia University and the Flatiron Institute to understand, control and manipulate the uniquely useful properties of quantum materials. The New York City Center for Non-Equilibrium Quantum Phenomena aims to harness these materials for a wide range of applications, including quantum computing and innovative measurement and cryptography technologies. Together, the scientists will study quantum materials that are not settled into a stable state. Scientists can perturb these materials using methods such as electric currents, heat pulses and barrages of photons or by embedding them in quantum cavities. In non-equilibrium states such as these, a material may exhibit new properties such as magnetism, ferroelectricity or superconductivity. If researchers succeed in carefully controlling these processes, they could develop materials for wide-ranging and potentially revolutionary applications. The new research center at Columbia University was inaugurated by all four partner institutions in November 2019.

On the net

Neighborly assistance
African grey parrots voluntarily help others to obtain food without expecting anything in return – showing they understand when they have to "lend a wing" to a peer! The parrots exhibit a high level of social intelligence and willingness to cooperate. They readily help others, even when there is no immediate opportunity for return. Moreover, they return received favors and do not appear to be jealous if their fellow grey parrots obtain a better reward than themselves. Our YouTube video demonstrates this fascinating neighborly assistance.
https://youtu.be/HEvO5SBiv6k

Marshmallow experiment 2.0
An adapted version of the famous Stanford "marshmallow experiment" from the late 1960s, which explored the importance of young children's ability to delay gratification to future life success, shows how sweet it is to cooperate. The study, conducted by Rebecca Koomen, Sebastian Grueneisen, and Esther Herrmann of the Max Planck Institute for Evolutionary Anthropology, suggests that kids are more willing to delay gratification for cooperative reasons than for individual goals.
https://sciencedaily.com/releases/2020/01/200114104024.htm

Farewell, UK!
On January 31, 2020, the United Kingdom left the European Union after 47 years of membership. But what impact will Brexit have on universities, joint research programs and scientific exchange? The European University Association (EUA) has prepared an overview of the consequences. Read EUA's briefing with a focus on areas of relevance to universities.
https://eua.eu/resources/publications/906:brexit

Photo: Asiya Khaki

License for new drugs to treat Parkinson's disease

The company Modag is developing a substance discovered by researchers in Goettingen and Munich

In most cases, Parkinson's disease first appears between the ages of 50 and 60. It is characterized by the loss of dopamine-producing nerve cells in the substantia nigra, a structure in the midbrain. Under the microscope, abnormal deposits of clumped alpha-synuclein proteins are visible in the brain, which appear to be extremely toxic to nerve cells. Until know, there were no drugs that tackled the root causes of Parkinson's disease. This is where the work of research teams led by Armin Giese of LMU Munich and Christian Griesinger of the Max Planck Institute for Biophysical Chemistry in Goettingen comes in. A few years back, the two researchers discovered an active substance that significantly reduces the rate of growth of the protein deposits and delays nerve cell degeneration in mice. However, applications in humans remain a long way off. The company Modag has taken over the preclinical development of the substance and, with a patent for new chemically modified drug candidates, agreed another exclusive license with the Max Planck Society in September 2019. On this basis, Modag can now push forward with the development of new drugs for Parkinson's disease.

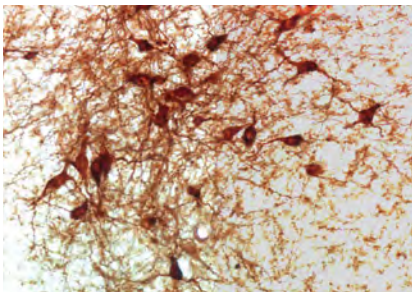

Photo: Max Planck Institute of Neurobiology / Aron & Klein

Disrupted system: dopamine-producing nerve cells in the brain of a diseased mouse.