

# Landmarks in science

Max Planck President looks ahead to future research topics at the annual meeting

100 years after the Nobel Prize was awarded to Max Planck, Martin Stratmann believes that science is once

again experiencing epochal change. As the Max Planck President emphasized in his speech at the close of the 69<sup>th</sup> an-

nual meeting in Heidelberg, data-driven research has joined experimentation, theory and simulation as a “fourth paradigm”. In addition to big data, the life sciences in particular are seeing further revolutionary innovations such as the CRISPR-Cas9 genetic scissors and organoids, i.e. organ-like cell tissue grown in Petri dishes. Stratmann also mentioned public concern at recent developments in science. The Max Planck Society takes both these fears and its responsibility very seriously. Other speakers at the Plenary Assembly included Baden-Wuerttemberg’s Minister of Science Theresia Bauer. The ceremonial address was given by Stephen Mann of the University of Bristol, a pioneer in the newly forming research field “Origin of Life”. The Directors of the Max Planck Institutes and the research organization’s central decision-making bodies came together for this two-day annual meeting. Prizes were also awarded to 36 outstanding young scientists, including the Otto Hahn Medal for outstanding doctoral research.

Past and future: at the annual meeting for 2018, Max Planck President Stratmann paid tribute to Max Planck on the 100<sup>th</sup> anniversary of his being awarded the Nobel Prize and looked ahead to innovative new research topics.



## The size of raindrops

First prize in the Physics category at the national finals of “Jugend forscht” goes to Max von Wolff from the Megina Gymnasium in Mayen

A measuring device for raindrops – this invention won Max von Wolff, a pupil at the Megina Gymnasium in Mayen in the Rhineland-Palatinate, first prize in the Physics category of the “Jugend forscht” contest for young researchers. The prize, which is worth EUR 2,500, was presented by Martin Stratmann at the national finals in Darmstadt. The Max Planck President was visibly impressed by the “deep interest in physics” shown by the pupil. The 18-year-old’s project addressed the question of how to record the size of raindrops. He constructed an apparatus in which raindrops fall on a syn-

thetic membrane and make it oscillate. Sensitive sensors register the membrane’s fine vibrations and send the measurements to a computer that uses them to calculate the size of the raindrops. This would enable meteorologists to better predict the course of a hurricane, for example, based on the size of the raindrops. More than 12,000 pupils from all over Germany took part in the 53<sup>rd</sup> “Jugend forscht” contest. The Max Planck Society has been funding this contest for many years; since 2012, it has provided all the physics prizes for all levels from the regional competitions to the national finals.

# “A price tag on citizenship”

Ayelet Shachar reflects on how visas for the super-wealthy are changing politics and society

Immigration policy is a highly contentious topic in many western countries. They are increasingly closing their borders to all kinds of immigration – with one exception: many governments are actually courting wealthy capital investors, not least in terms of citizenship. Ayelet Shachar, Director at the Max Planck Institute for the Studies of Religious and Ethnic Diversity, takes a closer look at the so-called golden visa programs.

*Ms. Shachar, can you tell us a little bit more about these golden visa programs?*

**Ayelet Shachar:** I would refer to this visa as a tailor-made pathway for the world’s super-rich to acquire citizenship – quickly and simply without any disruption to their life. In certain cases, these new citizens do not even need to set foot in their new home country.

*Don't they have to do anything in return?*

The governments seem to be saying something along the following lines: “Bring us your wealthy.” On civic integration, they say: “If money is the currency for access, then we are more than willing to waive or bypass the standard civic integration requirements” that are otherwise jealously enforced. Of particular note is the fact that the requirements applicable to all other migrants have become more restrictive in recent years.

*How much does this kind of privileged access cost?*

The American golden visa program formally requires an investment of one million dollars. In practice, that amount is typically reduced to 500,000 if you invest in specifically designated areas. In the United Kingdom, the minimum investment is two million pounds sterling, and if you invest that, you establish what is called a “leave to remain”. The greater the investment, the shorter the time that the investor has to wait to establish their residency.

*Do the programs actually accomplish their purported goal of bringing economic investment or providing long-term benefits to the economy?*

This is interesting, because the programs for which we have more data are the ones that ran for a longer time, the investor visa programs that, say, Canada and the United States have had. In the United States, a current governmental study says – I’m quoting now: “The government cannot demonstrate that the program is improving the U.S. economy and creating jobs for U.S. citizens.” In Canada, which had a very successful investor visa program for a number of years, similar conclusions were drawn and the program was canceled in 2014. The situation was such that many people actually acquired citizenship and then left; they were not active in any way either in society or in the economy. Of course, this is a generalization, but this trend was identified at least in these two countries that have a longer track record.

*In your view, what are the ethical problems associated with this visa?*

Visa programs for wealthy people provide preferential treatment to the global one percent. The great ethical concern here is that these programs exacerbate inequality. A second set of concerns deals with the intrusion of the market into the political sphere. Citizenship is actually about political relations, the special bond between a person and her fellow citizens and their relationship to a given government. If you put a price tag on citizenship, you are not just sending a clear message about who is wanted and who is seen as a valuable future citizen, you’re really recasting something deeper: membership in the political community.

*Is it fair to say that if you are very rich, you essentially get your own set of rules?*

I think you’re correct. We have seen this in other fields. I think it’s quite new and to some extent surprising that we are also seeing it in the heart of citizenship. But these rules didn’t fall from the sky, they were introduced by the respective governments. I think once we call attention to these kinds of golden visa programs, we can step back and ask questions about how citizenship is granted. Do we think these rules are fair? When we think about



Ayelet Shachar

immigration and inclusion of newcomers, should we include some consideration for justice and equality and not just self-interest? I think de facto most countries do wish to have a blend. Perhaps we need to rebalance this kind of distribution.

Interview: John Krzyzaniak

Editor: Mechthild Zimmermann

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An in-depth version of this interview was published on the website of the Carnegie Council for Ethics in International Affairs ([www.carnegiecouncil.org](http://www.carnegiecouncil.org)).

# Live videos from inside the body

Jens Frahm wins European Inventor Award for fast magnetic resonance imaging

“The European Inventor Award is a great honor and a marvelous acknowledgement of the innovative work done by the whole research team.” With these words, Jens Frahm expressed his thanks for the distinguished award presented to him by the European Patent Office in recognition of his work at the Max Planck Institute for Biophysical Chemistry in Goettingen. Frahm and his group succeeded in accelerating magnetic resonance imaging (MRI) procedures by up to 10,000 times and establishing this technology in clinical practice. Back in the 1970s, the first MRI machines required patients to lie absolutely still for minutes at a time to

obtain a useful image – a significant disadvantage compared to the much faster ultrasound and x-ray imaging procedures. The FLASH technology developed by the team of researchers led by Jens Frahm reduced the imaging speed to just a few seconds and made MRI one of the most important diagnostic imaging procedures. Physicians worldwide use this method for around 100 million screenings a year. With the FLASH2 method, the team from Goettingen also succeeded in taking a step towards real-time MRI, with which it has now become possible to film processes inside our bodies for the first time.



Luminary in MRI technology: Jens Frahm from the Max Planck Institute for Biophysical Chemistry.

# Tracking animal movements

New research center set up with Yale University to promote biodiversity protection

From butterflies to whales – animals are constantly on the move. At the same time, living conditions on our planet are changing rapidly. The Max Planck Society and Yale University in the U.S. aim to forge ahead with the study of animal movements in changing habitats and have established



a joint research center for this purpose. The goal of the Max Planck - Yale Center for Biodiversity Movement and Global Change is to improve the analysis of habitat-related and environmental data, animal movements and the distribution of species. Biologists, statisticians, computer scientists and geoscientists will be collaborating closely at the center with this aim in mind. The two partners, the Max Planck Institute for Ornithology in Radolfzell and the Yale Biodiversity and Global Change Center, complement each other perfectly in this area. “The Max Planck - Yale Center will not only make significant advances in ecology and biodiversity research,” emphasizes Max Planck President Martin Stratmann. With animals as sensors of environmental changes, it will also create a new public awareness of the threats to our natural resources. The Max Planck Society and Yale University are investing five million euros in the center, which is planned to run for a period of five years.

Joint project: Martin Wikelski, Director at the Max Planck Institute for Ornithology, Max Planck President Martin Stratmann, Yale President Peter Salovey, Walter Jetz, Co-Director of the Center, and Peter Schiffer from Yale University (from left).

# Quality control deters predators

Economic success attracts fraud – even in the marketing of research results like in scientific publishing. Worldwide, the annual turnover of scientific articles alone amounts to 8 billion in euros. Unfortunately, big money like this attracts fraudulent, so-called predatory publishers, conference organizers or online journals, who want to cut in on the action. These players fake high-quality publishing business processes and a competitive pricing structure. However, they tend to provide no quality assurance like peer reviewing or an editorial board and little to no editorial oversight, while fees for publication are excessive.

Compared to the total amount of scientific articles published in recognized journals only a small number of papers appears in predatory magazines. For instance in 2017 the reputable Web Of Science database listed 1.7 million articles, whereas the number of articles distributed by OMICS, an example of a predatory publisher, is less than 0.9 percent (as of 2017) of the number of trustworthy articles. The journals of OMICS are currently not listed in Web Of Science.

In the Max Planck Society the fraction is as a matter of fact negligible: of the 120,000 scientific articles produced with the participation of Max Planck authors in the years 2007-2017 only nine articles, a share of 0.01 percent, appeared in OMICS magazines – which does not mean that these articles are automatically spurious.

The scientific publication system not least serves to bring theories, hypotheses, observations, and indications of knowledge which still need to be examined, to the scientific discourse. However, it is part of the normal working procedure of a scientist to categorize every scientific publication before use according to the criteria of “fact vs. scientific speculation vs. non-scientific nonsense”. Brands and names of journals can serve as a supporting aid, but ultimately only a critical scientific examination of the content of the article can be decisive.

In order to combat practices such as predatory publishing, regardless of whether in connection with the traditional subscription model or Open Access, it is primarily important to become as informed about this threat as possible and to continue to raise awareness for high quality and serious practices.

## On the net



### International law in focus

Unlike medicine, sciences and many of the humanities and social sciences, there are hardly any research prizes for outstanding scholars in the field of law. The Max Planck Institute for Comparative Public Law and International Law and the University of Cambridge's Lauterpacht Center for International Law have therefore established the Max Planck Cambridge Prize for International Law to honor an outstanding scholar for their academic work and function as a role model for aspiring young law specialists. The prize, which is worth EUR 20,000, is sponsored by Supporting Members of the Max Planck Society.  
[www.mpg.de/11810198/Donation\\_project\\_2018](http://www.mpg.de/11810198/Donation_project_2018)

### Color game in black and white

A new free games app – The Color Game – is helping Olivier Morin from the Max Planck Institute for the Science of Human History in Jena take a new approach to researching the development of language. The goal of the game is to inform another person of a randomly allocated color. Instead of words, players can only use a fixed selection of black and white symbols that have no obvious connection with any of the colors. As difficult as this sounds, previous lab experiments have shown the researcher that the test subjects get the right answer more frequently than might be expected. Moreover, the players improve over time. Could this be a way of breaking through language barriers and using symbols rather than sounds to communicate with other people? You can make a playful contribution to help shed light on this research question!  
<https://colorgame.net/en/>

### Spot on!

The Max Planck Institute for Social Anthropology is launching a series of video clips called “Spot On – Three Minutes of Anthropology”, where researchers of the Institute present a three-minute introduction of themselves and their work. The first video, featuring Brian Campbell, is already online. In it, he explains his work on “Convivencia: Iberian to Global Dynamics, 500-1750”; a multi-disciplinary venture jointly conducted by the Max Planck Institute for Social Anthropology, the Max Planck Institute for European Legal History (MPIeR), the Kunsthistorisches Institut in Florenz and the Max Planck Institute for the History of Science.  
[www.youtube.com/watch?v=6S\\_om7SSf2Y](http://www.youtube.com/watch?v=6S_om7SSf2Y)