An important visitor in Vancouver and Ottawa

Federal research minister Anja Karliczek visits German-Canadian cooperation projects of the Max Planck Society

Interested in quantum technology: Federal Research Minister, Anja Karliczek, learned about the Max Planck Center in Vancouver from Max Planck Director Bernhard Keimer (left) and his Canadian colleague Andrea Damascelli.

As part of a trip to Canada, the German Federal Minister for Education and Research, Anja Karliczek, also paid a visit to the Max Planck Centers in Vancouver and Ottawa. "The Max Planck Centers make key contributions to the exploration of quantum technologies and the international exchange of scientists," said the minister, who was accompanied by members of the Bundestag Committee on Education, Research, and Technology Assessment. In Vancouver, the delegation gained insights into research projects at the Max Planck-UBC-U Tokyo Center for Quantum Materials. The Center is home to a close collaboration between several Max Planck Institutes, the University of British Columbia in Vancouver and the University of Tokyo. Two of its Co-Directors, Bernhard Keimer of the Max Planck Institute for Solid State Research and his Canadian colleague Andrea Damascelli, presented the minister with an overview of initial successes that have emerged from collaboration in the area of high-temperature superconductors. On the visit to the Max Planck University of Ottawa Centre for Extreme and Quantum Photonics, researchers explained to the delegation how they are developing high-intensity laser sources with a view to optimizing manufacturing processes in the future.

Fields Medal for Peter Scholze

The new Director at the Max Planck Institute for Mathematics is awarded the highest distinction in his field

The Fields Medal is considered the Nobel Prize of mathematics, and this year the International Mathematical Union chose to award it to Peter Scholze. The professor at the University of Bonn's Hausdorff Center for Mathematics and Director at the Max Planck Institute for Mathematics received the award during the International Congress of Mathematicians in Rio de Janeiro. The 30-year-old is only the second German ever to receive the prize. Peter Scholze was awarded the medal in recognition of his groundbreaking contributions to arithmetic geometry. Combining number theory with geometry, this field of mathematics explores the properties of integers using geometrical methods. This approach has been able to prove centuries-old problems, such as Fermat's Last Theorem, which could not be solved using methods based purely on number theory. Arithmetic geometry also provides the basis for many modern encryption methods. The Fields Medal is awarded every four years to recognize "outstanding mathematical achievement for existing work and for the promise of future achievement." Recipients must be no more than 40 years of age.

Exceptional talent: Peter Scholze, a professor at the University of Bonn and Director at the Max Planck Institute for Mathematics.

Photos: UBC/Paul H. Joseph (top), Volker Lannert (bottom)

"Our limit value is unacceptably high"

Jos Lelieveld speaks about the lethal consequences of air pollution, especially as a result of fine particulate matter

Jos Lelieveld

In the year 2015, air pollution caused the premature deaths of some 4.5 million people worldwide, including 237,000 children. This is the conclusion reached by a team working under Jos Lelieveld, Director at the Max Planck Institute for Chemistry, in a study in the journal Lancet Planetary Health. By way of comparison, smoking causes around 6.4 million premature deaths each year. Researchers have found the most dangerous pollutant to be fine particulate matter with a particle size of less than 2.5 micrometers – this alone was responsible for the deaths of 4.3 million people in 2015.

Mr. Lelieveld, how do you know which airborne pollutants lead to which diseases and how many deaths they cause?
Jos Lelieveld: The method we use is the same as that for determining the number of premature deaths due to smoking. It is based on cohort studies involving over a million people, primarily in Europe and the U.S. These studies record the conditions in which people live and the risk factors they are exposed to, taking account not only of environmental factors but also of diet, for example. Statistical methods are then used to attribute the diseases to the risk factors.

In 2013, you estimated the number of deaths due to air pollution to be 3.3 million. Why are death rates considerably higher now?
The epidemiological data has improved considerably since then. That being said, our figures are still very conservative. There are indications that death rates due to air pollution are even higher in India and China, for example. In some parts of China, India, and Africa, the air is far more polluted than in the U.S. and Europe, where the cohort studies are conducted. The effect could therefore be even greater. It also turns out that we have not yet considered all the diseases that could – at least partly – be caused by air pollution.

What needs to happen in order to reduce the number of premature deaths, especially among children?
In poorer countries, such as in Africa, many children die of pneumonia due to airborne pollutants, primarily as a result of poor diet and inadequate medical care. Action is therefore needed on three different fronts. Of course, the air needs to become cleaner, but improvements are also needed in diet and medical care. In India, for example, this approach has already yielded positive results: although air pollution increased between 2010 and 2015, the mortality rate for children fell by 30 percent. Indeed, children in India probably develop pneumonia more often nowadays, but improvements in medical care mean it's less likely to be fatal.

Are politicians doing enough to tackle air pollution?
That's not the impression I get. Unlike with malaria and HIV, the problem of air pollution is yet to register with politicians, particularly in Africa. In many poorer countries, refuse is burned on almost every street corner, partly due to the absence of a proper system of waste disposal. Here, it would help to explain to people that this is putting children's lives in danger. On top of that, many deaths among children could be prevented with simple, economical programs, such as the use of clean fuels for cooking and heating. This has been shown to work in India, where the widespread burning of cow dung was a major contributor to air pollution. The government therefore provided people with better ovens and access to clean fuels, often with support from private donors. If it wasn't for this, the country's air pollution would probably be even worse today.

According to your study, many people still die as a result of air pollution, even in Central Europe. Has the region's air quality not improved?
Although air quality has improved significantly since the 1970s, it still isn't good. Moreover, the high population density means that many people are exposed to poor-quality air, and so the mortality rate in Central Europe is similar to that in India. This is also because the air quality here is generally poor – unlike in India, where there are areas with very bad air but also some with cleaner air.

Why does this problem primarily affect old people in our society?
The excellent medical care available here means that children very rarely die of pneumonia. Similarly, older people generally don't die of pneumonia brought on by airborne pollutants, but rather of cardiovascular diseases. Arteriosclerosis, the main cause of such diseases, develops over the course of many years.

What is your assessment of the EU's limit values?
The limit value for fine particulate matter is 25 micrograms per cubic meter of air. In comparison, the limit is 12 in the U.S. and 10 in Canada, which is also the figure recommended by the WHO. However, we only talk about truly clean air at levels below 2.5 micrograms per cubic meter. Our limit value is therefore unacceptably high, and it is even more unacceptable if it is exceeded in some German cities. A limit of 25 micrograms is not sufficient to prevent diseases.

Are we setting the right priorities with the debate surrounding nitrogen oxides from diesel cars?
The debate isn't really getting us anywhere. In my opinion, fine particulate matter is a bigger problem. Generally speaking, diesel vehicles are very dirty. Cars meeting the Euro 6 standard are much cleaner, but I'm worried about how effective they'll be at reducing emissions in ten years' time. Besides, although fine particulate matter is partly formed by nitrogen oxides from traffic, there are also other sources – especially coal-fired power plants and agriculture.

Interview: Peter Hergersberg

Photo: Thomas Hartmann

Award for pioneering achievements in palaeogenetics

Max Planck Director Svante Pääbo receives the lucrative Körber Prize 2018

Award ceremony in Hamburg: Svante Pääbo (center) is awarded the Körber Prize 2018 by Max Planck President Martin Stratmann (left) and Lothar Dittmer, chairman of the executive board of the Körber Foundation.

After making a name for himself with his revolutionary insights into the origins of humankind, he has now received another prestigious science award: Svante Pääbo, Director at the Max Planck Institute for Evolutionary Anthropology in Leipzig, has been awarded the Körber European Science Prize 2018. One of his most important scientific achievements is the decoding of the Neanderthal genome. "His work has revolutionized our understanding of the evolutionary history of modern humans," the jury said in their decision. They also cited the major role that his work has played in the realization that Neanderthals and other extinct hominids contributed to the evolution of modern humans. Even as a doctoral student, Pääbo succeeded in proving that DNA can survive in ancient Egyptian mummies. In the mid-1990s, Pääbo and his colleagues were the first to decipher part of the mitochondrial DNA of a Neanderthal. In 2014, the team in Leipzig succeeded in completely reconstructing the Neanderthal genome. The Körber Prize, which Pääbo received in Hamburg in September, is one of the most lucrative research prizes in the world, carrying EUR 750,000 in prize money.

A journey through time in Dahlem

A new smartphone app provides users with information about the science hub in Berlin

The Dahlem research campus in southwest Berlin made scientific history in the early 20th century. From 1912 onwards, it was the birthplace of numerous Institutes of the Kaiser Wilhelm Society, the forerunner to the Max Planck Society. Adolf Butenandt, a biochemist who conducted research in Dahlem in the 1930s, went so far as to say it felt like being in "science heaven". Like many colleagues working in the vicinity, Butenandt received a Nobel Prize for his research. To this day, traces of the site's checkered past can still be found in Dahlem. Now, a new smartphone app allows anyone to discover the campus for themselves. The illustrated audio guide takes in ten locations, which visitors can find easily thanks to a map featuring GPS tracking. The audio texts provide information about historical buildings and tell the stories of those who worked there and their discoveries. Examples include Otto Hahn and Lise Meitner, Albert Einstein, and Fritz Haber. The now legendary German uranium project at the Kaiser Wilhelm Institute for Physics brought the possibility of a German atomic bomb within reach during the National Socialist era. The reason why this never happened is revealed in the app, called DahlemTour Berlin.

The former home of many great minds: among others, the researchers in Dahlem included Lise Meitner, Fritz Haber, and Albert Einstein.

Photo: David Ausserhofer; collage: digitale frische, Cologne, with photos from the Archives of the Max Planck Society

Award for an animal-friendly technique

German agriculture ministry presents Animal Welfare Research Prize to Max Planck scientists

Dirk Görlich and Tino Pleiner from the Max Planck Institute for Biophysical Chemistry in Goettingen have succeeded in developing a technique that eradicates the need for large numbers of laboratory animals. For this work, the two scientists have been awarded this year's Animal Welfare Research Prize from the German Federal Ministry of Food and Agriculture. They developed what are known as secondary nanobodies, which can replace the most widely used antibodies in medicine and research. As a result, significantly fewer animals will be needed for antibody production in the future. Nanobodies are fragments of mini-antibodies, with particularly simple structures, that can be formed in the blood of camel-like animals such as alpacas. Once these nanobodies have been extracted from a small blood sample taken from an alpaca, they can be reproduced in the laboratory on any scale and as often as necessary using bacteria. Until now, large-scale antibody production has required the use of tens of thousands of laboratory animals each year. In addition to their natural function of affording protection against disease-causing organisms, antibodies are indispensable tools in biomedical research and in medical diagnostics and treatment. For example, they are used in pregnancy tests and to establish blood groups.

Photo: Swen Pförtner/Max Planck Institute for Biophysical Chemistry

Special immune system: the antigens that alpacas form in their blood can be reproduced in the laboratory using bacteria.

Berlin: party with live chemistry show.

Hanover: trying on cleanroom suits.

Duesseldorf: interactive experiments for children.

Hamburg: talks by the "Flying Professors" on the underground.

Max Planck Day

Eighty-two Institutes present their research as part of a nationwide initiative

From Freiburg to Rostock and from Cologne to Dresden: on 14 September 2018, 35 German cities held a series of events centered around this colorful hashtag. The Max Planck Society used this logo and the question "What are you looking for?" to spread the word about Max Planck Day in the run-up to the festival, which saw a total of 82 Institutes invite citizens to experience research firsthand. Events included tours and interactive experiments, science slams and debates, children's activities, and quizzes. The program generated a great deal of interest, with the science market in Munich alone attracting over 5,000 visitors. Likewise, Max Planck Institutes across the rest of the country also reported large crowds – amounting to some 22,000 people in total.

Frankfurt: "Thirst for Knowledge" – a bar evening with short talks.

Munich: science market featuring 20 Institutes and an on-stage program.

Stuttgart: science stand-up Vince Ebert.

Photos: Thomas Eisenkrätzer, O. Burmeister, Yasmin Ahmed Salem, MPI für Eisenforschung, Friedemann Bayer, Axel Griesch, MPI for Empirical Aesthetics, Johanna Detering/MPI for Comparative and International Private Law (clockwise from top left)

The heads of the first Dioscuri Centers

Aleksandra Pekowska and Grzegorz Sumara will each set up a group at the Nencki Institute in Warsaw

The leaders of the first two Dioscuri Centers have been chosen. In the selection procedure, Aleksandra Pekowska and Grzegorz Sumara prevailed against 45 applicants from all over the world. The Dioscuri program was initiated by the Max Planck Society and aims to establish internationally competitive research groups with the support of German partners, initially in Poland and potentially also in other Central and Eastern European countries at a later stage. Starting next year, Aleksandra Pekowska will establish the Dioscuri Center for Evolutionary and Functional Genomics of Astrocytes – specific cells in nervous tissue – at the Nencki Institute for Experimental Biology in Warsaw. Pekowska is currently conducting research at one of the U.S. National Institutes of Health. Grzegorz Sumara's Center, which is also being established at the Nencki Institute, will focus on the elucidation of signaling pathways that play a role in metabolic diseases. Sumara is currently working at the University of Wuerzburg. Each of the Dioscuri Centers of scientific excellence will be financed with up to EUR 1.5 million for a period of five years. The costs will be shared equally between the Federal Ministry of Education and Research (BMBF) and the Polish government, with the host institutions in Poland providing the infrastructure.

Strengthening Polish research: Aleksandra Pekowska is moving from the U.S. to Warsaw, Grzegorz Sumara from Wuerzburg.

Photos: NCN/Michał Niewdana

On the net

Harnack Lecture 2018
This year's Harnack Lecture – an honorary event organized by the Max Planck Society to commemorate Adolf von Harnack (1851 to 1930), the German science reformer – was delivered by Steven Pinker on 24 October in the packed Goethe Hall of Berlin's Harnack House. Pinker's speech was a passionate plea for an optimistic worldview as well as an appeal to the assembled scientists to dare more optimism. Pinker believes that thinking positively is far from being a naive hope, but rather grounded in facts. He argues that the world has become progressively better in the last three hundred years. Ultimately, the driving force is science, the findings of which have not only led to an improvement of living conditions, but also to the humanitarian ideas that have made human. You can watch his lecture on the MPG's YouTube channel.
https://youtu.be/YUNSdy9esio

Research is curiosity
"What are you looking for?" was the question posed by the Max Planck Society this summer, when it called on people to put their questions to academia. At the same time, the two video bloggers MrWissen2go and Doktor Whatson went on a Germany-wide tour to visit various Max Planck Institutes. The pair met scientists to discuss interesting topics at a series of unusual locations, such as the value of goods in a wine store or gravitational waves at a flooded gravel pit. The 16 resulting videos can be found on the *wonachsuchstdu* ("whatareyoulookingfor") website along with the submitted questions and the Max Planck researchers' answers. The site also invites readers to browse and ask questions of their own.
www.wonachsuchstdu.de (in German)

Kaleidoscope of science
A collection of 30 striking photographs from the MPG's Images of Science exhibition is currently on show at the Phillip and Patricia Frost Museum of Science in Miami Florida, presented by the Max Planck Florida Institute for Neuroscience. The images, which will be shown from December 15, 2018 – June 16, 2019, showcase the scientific research from some of the MPG's work around the world. In addition to a purely scientific documentation of research objects, sometimes images are created that feature surprising aesthetic forms and structures — abstract works of art from a world normally hidden to the human eye. The images will be on display from December 15, 2018 – June 16, 2019. A short by trailer by Max Planck Florida introduces the exhibition.
https://youtu.be/9ajksGC3VRU