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Halle (Saale), 25 November 2022

Statement on brain organoids

New perspectives for brain research

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The Leopoldina on Social Media



Editorial

Dear Members and Friends of the Leopoldina,

At a time when one crisis rolls into the next, it is important that the public debate includes science-based advice. For this reason there are several articles in this issue that look at how science is communicated. In our series on policy advice, molecular biologist Mona Nemer describes her experiences as a government advisor in Canada at the interface between science and politics (page 12).

The topic of how researchers talk to journalists is discussed in a report by this year's Leopoldina Journalist Collegium "Climate Research: Data, Models and Solutions from Science" from 8 to 10 September at the Alfred Wegener Institute, Helmholtz Center for Polar and Marine Research (AWI) in Bremerhaven, Germany (page 13).

In her role as Director of the host institute AWI, Leopoldina member Antje Boetius was also a speaker at the Journalist Collegium. In December Boetius will be awarded this year's Carl-Friedrich-von-Weizsäcker-Prize by the Leopoldina and the Stifterverband, the most important German award for scientists in the field of science-based policy advice.

In this issue of the newsletter Boetius talks of her fascination with marine research and the importance of microbial communities for the climate system (page 7). At the awards ceremony on 12 December, the marine researcher will also give the traditional Christmas Lecture at the Leopoldina. You are warmly invited to take this as an opportunity to visit Halle once again!

I hope you find this issue an interesting and inspiring read!



Prof. (ETHZ) Dr. Gerald Haug, President of the Leopoldina

Image: David Ausserhofer | Leopoldina

The Nobel Prize in Chemistry goes to Leopoldina member Carolyn Bertozzi

The biochemist receives the award together with Morten Meldal and K. Barry Sharpless



Image: Andrew Brodhead | Stanford University

The US-American biochemist Carolyn R. Bertozzi, a member of the Leopoldina since 2008, will be awarded this year's Nobel Prize in Chemistry. Bertozzi receives the award jointly with Morten Meldal (Denmark) and K. Barry Sharpless (USA) for the development of click chemistry and for major contributions to bioorthogonal chemistry.

Carolyn Bertozzi is considered to be a pioneer of glycobiology. Her focus is the function of glycans on cell surfaces. These sugar residues play an important role in the communication and metabolism of cells and they change in case of disease. In order to be able to observe this in living cells, Bertozzi has established a new field of research in the form of bioorthogonal

chemistry. With her interest in glycans she has entered a little-explored field of science. Presumably a large proportion of all proteins are glycosylated.

“Carolyn Bertozzi has taken click chemistry to a new level.”

Gerald Haug ML
President of the Leopoldina

Bertozzi aims to understand the role that these sugars play in biological processes and how glycosylation patterns change as a person ages or in the case of disease. On this basis, methods can be developed for the early detection and treatment of cancers, infectious diseases

or autoimmune diseases. Until now, there were no methods by which these molecules could be specifically observed. By means of the bioorthogonal chemistry developed by Bertozzi, this is now possible. Molecules in living cells can be chemically modified so that they can be observed.

The President of the Leopoldina, Gerald Haug, congratulates the American researcher: “Carolyn R. Bertozzi has taken click chemistry to a new level. It can be used to study diseases such as cancer in a completely new way. She has now been awarded the Nobel Prize in Chemistry for this ground-breaking research.”

■ JK, AB



[Carolyn R. Bertozzi](#)

The Nobel Prize in Medicine goes to Leopoldina member Svante Pääbo

The paleogeneticist has been honoured for his research into human evolution



Image: Frank Vinken | Max Planck Institute for Evolutionary Anthropology

This year's Nobel Prize in Physiology or Medicine will be awarded to the Swedish researcher of evolution Svante Pääbo, member of the Leopoldina since 2001. Pääbo is considered to be the founder of paleogenetics, which analyses genetic samples of fossil and historical remains of hominids.

The molecular biologist and paleogeneticist receives the award for his research into the genomes of extinct hominids and human evolution. Pääbo has developed analytical techniques for decoding the genome of Neanderthals and others. He has thus been able to determine the proportion of genes from Neanderthals and other extinct hominids to be found in the genetic material of humans today.

Gerald Haug, President of the Leopoldina,

dina, congratulates Svante Pääbo: "This award recognises ground-breaking find-

"This award recognises ground-breaking findings that have given us a new impression of early humans."

Gerald Haug ML
President of the Leopoldina

ings in the field of paleogenetics, which have given us a new impression of early humans."

Pääbo first detected evidence of DNA in Egyptian mummies. He then developed completely new methods for determining

genetic sequences from historical remains ("ancient DNA"). In this way, he was able to obtain mitochondrial DNA sequences from the bone of a Neanderthal man and sequence over three billion base pairs of cell nucleus genomes from extinct prehistoric man. This made it possible to compare the genome of modern humans with that of Neanderthals for the first time. With his team, he was able to prove that Neanderthals passed on their genes to all humans today living outside of Africa.

Pääbo's research opens up new perspectives on evolutionary processes and provides detailed insights into the relationships between extinct human groups.

■ JK, LO



[Svante Pääbo](#)

The Nobel Prize in Physics goes to Leopoldina member Anton Zeilinger

Joint award for the quantum physicist with Alain Aspect (France) and John F. Clauser (USA)

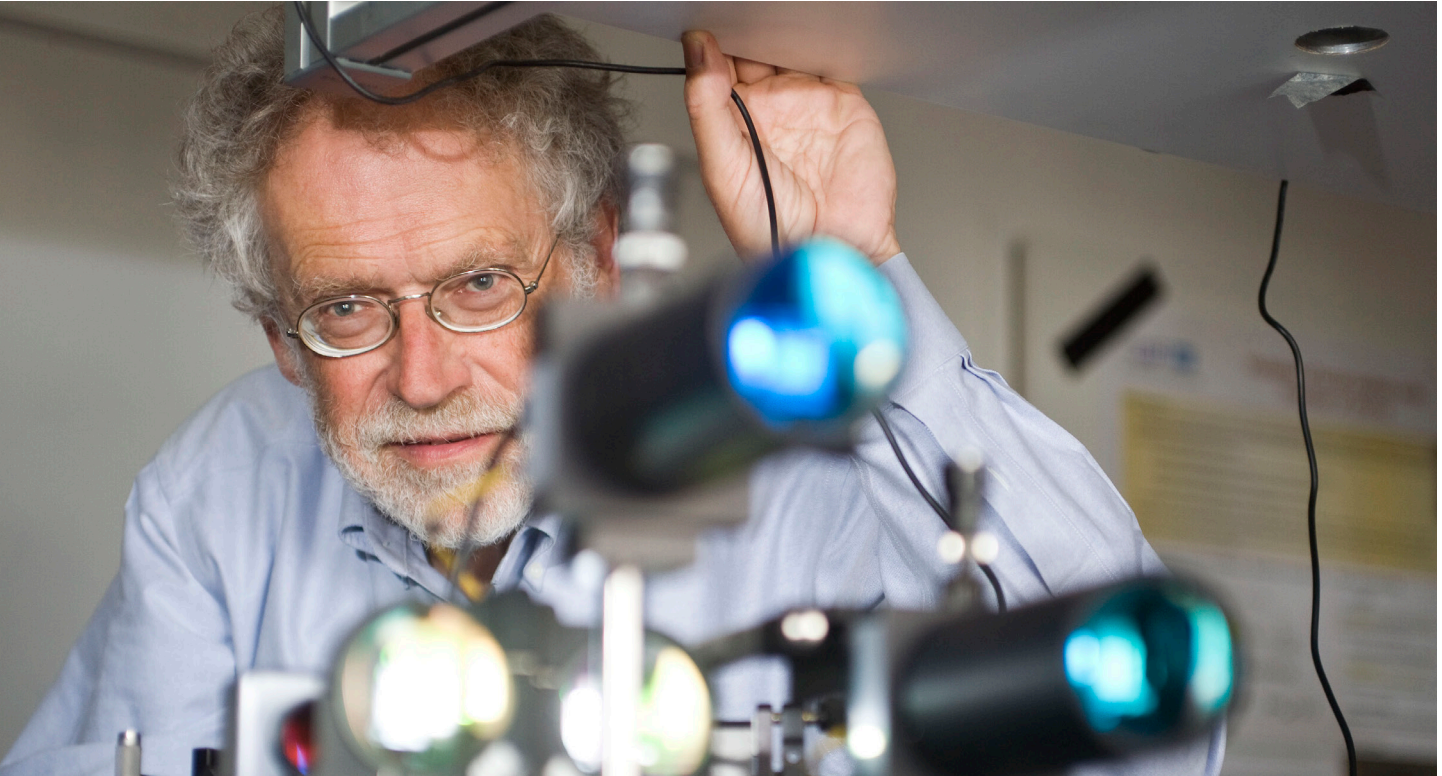


Image: Jacqueline Godany | OEAW

Austrian quantum physicist Anton Zeilinger receives the Nobel Prize in Physics 2022. Zeilinger, a member of the Leopoldina since 2005, receives the award jointly with Alain Aspect (France) and John F. Clauser (USA). The three quantum researchers are honoured for their ground-breaking experiments on entangled quantum states.

Anton Zeilinger's research has brought new insights into quantum technology and a new interpretation of quantum mechanics. He has delivered studies on quantum information and quantum cryptography. In 1997 he succeeded in demonstrating the entanglement of more than two particles, also referred to as quantum teleportation. This involves the direct transfer of the state of a light particle, overcoming

time and space. This process is a method of quantum communication, in which no particles are transferred from one place

“We are delighted that Anton Zeilinger, a Leopoldina member from Austria, is one of the prize winners.”

Gerald Haug ML
President of the Leopoldina

to another in the standard sense but only their quantum state.

Further developments eventually led to quantum cryptography, which also uses the entanglement of particles. This technology enables the tap-proof en-

ryption of messages and data transmissions. The results of the three quantum scientists have paved the way for the new technologies based on quantum information.

Zeilinger co-authored the Leopoldina statement “Perspectives on Quantum Technology”, published in 2015. “This year’s Nobel Prize in Physics recognises significant research results which have laid the foundation for a new era of quantum technology. We are delighted that Anton Zeilinger, a Leopoldina member from Austria, is one of the prize winners,” stated Leopoldina President Gerald Haug in recognition of the award.

■ JK, AB



[Anton Zeilinger](#)

“We are not at the turning point yet”

The Weizsäcker-Prize winner Antje Boetius on her research and communicating about it

Every two years, the Stifterverband and the Leopoldina award the Carl-Friedrich-von-Weizsäcker-Prize worth 50,000 euros. It honours researchers who have made a scientific contribution to solving important challenges in society. This year's prize winner is marine biologist Antje Boetius ML. In her interview she talks of her fascination for the subject and why she has become involved in policy advice and science communication.

The Carl-Friedrich-von-Weizsäcker-Prize recognises both your scientific work and your social commitment to science communication. Do the two go hand in hand?

Antje Boetius: My research on unknown regions of the earth, such as the deep sea, is about discovery and gaining fundamental insights into the energy sources of life, their distribution and function. In some aspects Earth is still like an alien planet to us. On the other hand, we see traces of human activity that are changing habitats everywhere. The job of communication is important so that people can make connections: What we discover needs to be reported quickly, so that we know what we should and should not do to protect ourselves and the network of life on Earth. The purpose of my communication is to create a picture of the unknown, an understanding of what we are dealing with, for example in the case of icefish or deep-sea



Marine biologist Antje Boetius is Director of the Alfred Wegener Institute, Helmholtz Center for Polar and Marine Research (AWI), in Bremerhaven/Germany and has been a member of the Leopoldina since 2009.

Image: Esther Horvath | Alfred Wegener Institute

microbes. If you look at the long list of things that have changed since our childhood due to climate change and the over-use of resources, the oceans and polar regions are already suffering tremendous damage.

You are also involved in policy advice.

Does this fall on fertile ground?

Boetius: Published papers already show that the language of politics has changed significantly: It recognises scientific knowledge and has become more ambitious in terms of goals. But unfortunately its impact is still largely non-existent, CO₂ and methane emissions continue to rise and more forests than ever are being destroyed worldwide. We have not yet noticed a change in direction, even though there are some hopeful signs, such as a slowdown in the world's use of coal. We have good knowledge, we know the levers, we can talk about it, but we are not at the turning point yet.

How do you deal with this?

Boetius: I am mostly concerned about the slowness of change. From a scientific point of view it is a race against time until climate targets are exceeded. We know from research on social trust and the development of democratic processes that it is difficult for people when political goals are ramped up but then not met. It is very important to have hope, to keep moving forward little by little and to talk about it. I do not see much of this in the political arena.

What is your personal view of the sea and the polar ice regions you are researching?

Boetius: I agree with Alexander von Humboldt, who talked about his unconditional feelings for nature as a prerequisite for research but at the same time carried out scientific measurements meticulously and tirelessly. It is possible to do both: to hold a thermometer in the ice and integrate data worldwide, and then find an empathetic way of talking about our experiences in a foreign landscape. Expeditions are particularly helpful for combining these two experiences.

■ THE INTERVIEW WAS CONDUCTED BY
ADELHEID MÜLLER-LISSNER

AWARD OF WEIZSÄCKER-PRIZES AND CHRISTMAS LECTURE

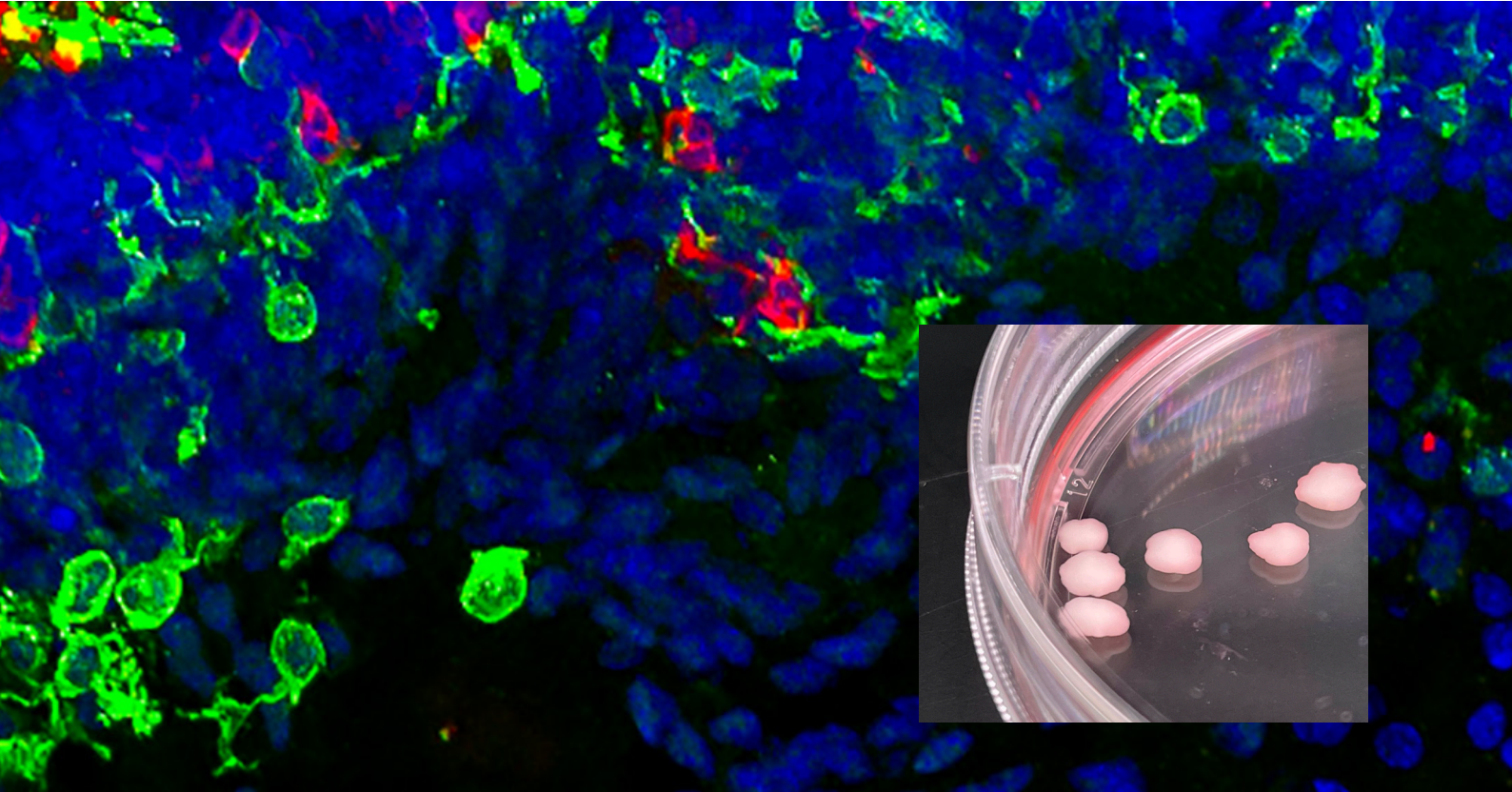
The Carl-Friedrich-von-Weizsäcker-Prize 2022 will be awarded on the occasion of the Leopoldina Christmas Lecture in Halle (Saale)/Germany on 12 December. The special edition 2021 of the Carl-Friedrich-von-Weizsäcker-Prize will be awarded at the same time. With this prize the haematologist, oncologist and immunologist Christoph Huber is honoured. His work in the field of cancer immunotherapy has served as a basis for the development of mRNA vaccines. The laudation will be given by the Nobel Prize winner Christiane Nüsslein-Volhard ML. The Weizsäcker-Prize winner 2022, marine biologist Antje Boetius ML, will give the Christmas Lecture on “Ocean Life”. ■ RED



Weizsäcker-Prizes and Christmas Lecture

“Perspectives for research into diseases of the brain”

Leopoldina member Hans Schöler and Jürgen Knoblich on the statement on brain organoids



A retinal organoid under the microscope: After staining with the assistance of antibodies, the light-sensitive molecules of the light-sensing cells of the retina can be seen in red and green. Small image: Brain organoids several millimetres in size in the Petri dish. Images: Yotam Menuchin Lasowski & Thomas Rauen; MPI Münster; IMBA

In October, the Leopoldina published the statement “Brain Organoids – Model Systems of the Human Brain”. It focuses on the perspectives and limits of research on tissue structures derived from stem cells as well as ethical and legal aspects.

BY HANS SCHÖLER ML*
AND JÜRGEN KNOBLICH*

The development and function of the human brain involves processes which do not occur in many animals. Therefore, the conventional approach of researching diseases and their cure in animal models has its limitations. Since it is usually neither

possible nor ethically justifiable to conduct research on the living brain of a human, brain organoids are a promising alternative for carrying out research into brain disease outside of the human body.

Organoids are tissue cultures derived from stem cells grown three-dimensionally in a Petri dish and which mimic the cellular architecture and some functional aspects of an organ. Such organoids exist for different human organs. Brain organoids, like the human brain, consist of nerve and glial cells. However, a brain organoid does not represent the whole human brain, only structures that are typical for specific regions of the brain.

At present, human organoids can reach a diameter of five to ten millime-

tres, which is at most the size of a pea. For comparison: The human brain with its approximately 86 billion neurons has an average volume of 1.23 litres. With up to 100 trillion neuronal contact areas, called synapses, it is also extremely complex.

Despite this, human organoids can still be used to gain important insights, which would not be possible with two-dimensional cell cultures. For example, the brain of the fruit fly *Drosophila* consists of only about 100,000 neurons. However, it supports a range of complex behaviours, including navigation and learning.

The statement therefore concludes that: Despite some limitations, brain organoids provide new insights into early brain development and the development



Hans Schöler ML

Head of an Emeritus Research Group at the Max Planck Institute for Molecular Biomedicine in Münster/Germany, where he was Director from 2004 to 2021. He works on the reprogramming of stem cells and carries out research on brain organoids. He has been a member of the Leopoldina since 2004.

Image: J. Müller-Keuker | MPI Münster



Jürgen Knoblich

Scientific Director at the Institute for Molecular Biotechnology (IMBA) of the Austrian Academy of Sciences in Vienna/Austria and Professor of Synthetic Biology at the Medical University of Vienna. His working group was the first to grow a brain organoid in a Petri dish in 2013.

Image: Sandra Schartel | IMBA

of neurological and psychiatric diseases. In addition, the effects of drugs, toxins, germs or viruses on human brain cells and brain development can be studied. For example, by using brain organoids it has been possible to show evidence of a causal link between a Zika virus infection and the development of microcephaly.

As a brain organoid contains individual genetic information on the person

“In the foreseeable future, research on and with brain organoids in vitro will not raise any ethical or legal issues requiring regulation.”

from whom the tissue cells have been taken, research with brain organoids also promises new discoveries that are specific to patients, for example regarding the individual action of specific drugs.

A further conclusion: In the foreseeable future, research on and with brain or-

ganoids in vitro will not raise any ethical or legal issues requiring regulation. The conditions in which human cells can be used to produce brain organoids are also sufficiently regulated. This also applies to the transplantation of brain organoids.

If current limits to the potential development of brain organoids are overcome in future, due to rapid progress in this research field, it would need to be examined whether established methods of internal scientific self-regulation and control by ethics commissions would need to be expanded, if necessary by an expert commission at state level along the lines of the German Central Ethics Commission for Stem Cell Research. It continues to be important to assess ethical, legal or socially relevant developments in this field of research at an early stage, in order to be able to react to them quickly.

* Leopoldina member Hans Schöler and Jürgen Knoblich are spokespersons for the Leopoldina working group “Brain Organoids”.

▶ **Statement „Hirnorganoid“
(English version in progress)**

ETHICAL CONSIDERATIONS

Bettina Schöne-Seifert ML, member of the working group “Brain Organoids” and Professor of Medical Ethics, on the ethical evaluation of research on brain organoids.



Image: Hannes von der Fecht | Leopoldina

Heart muscle, skin, kidney cells – all kinds of tissue can be grown from stem cells. What is special about brain organoids?

Bettina Schöne-Seifert: Seeing these entities in the Petri dish does raise questions. After all, nerve cells in “real” brains make up the biological substrate of our mind. It is important to ask whether brain organoids can develop any kind of consciousness and feel pain.

What is the answer?

Schöne-Seifert: Internationally, experts agree that brain organoids, as they are made now and in the foreseeable future, are miles away from developing even rudimentary consciousness of any kind. Their tissue structures are not large, complex and differentiated enough for that. Thus, as things stand at the moment, brain organoids are not entitled to any protection (“moral status”). Having said that, it would be unethical in our view to hinder or prohibit this research because of concerns about possible later developments and the need to draw boundaries. *What would cause this to be reassessed?*

Schöne-Seifert: It is important to keep an eye on the progress of this field of research. Should brain organoids be able to become significantly more complex in future, that would definitely be a reason. The transplantation of brain organoids into other animal brains, which is still in its infancy, may one day require new ethical considerations and decisions to be made.

■ THE INTERVIEW WAS CONDUCTED
BY ANNE BRÜNING

“We are drawing an arc from the foundations to the application”

Battery research: First Greve Prize for Leopoldina member Jürgen Janek and Kerstin Volz



The two Greve Prize winners Kerstin Volz and Jürgen Janek at the award ceremony on 17 November. The President of the Senate of the Free and Hanseatic City of Hamburg/Germany, First Mayor Peter Tschentscher, had invited to the ceremony at the Hamburg City Hall.

Image: David Ausserhofer | Leopoldina

Kerstin Volz and Jürgen Janek ML have been jointly awarded the first Leopoldina Greve Prize. This year the prize is awarded in recognition of outstanding achievements in the field of “Scientific Foundations of a Sustainable Energy Supply”. The physicist Kerstin Volz from Philipps University Marburg/Germany and the chemist Jürgen Janek from the Justus Liebig University of Gießen/Germany have been working closely together for many years in the field of scientific foundations of high-performance batteries.

You have both been researching high-performance batteries for many years. What attracted you to this field?

Jürgen Janek: The field of research into electrochemistry was virtually “dead” at the beginning of the 1990s. It was thought to be finished, but this was not the case – particularly in relation to the electrochemistry of solid materials. I researched materials for fuel cells, which went against the trend at the time. A key question for me was always how to keep electrochemical cells stable over a long period. Many materials “suffer” during operation because chemical side reactions take place continuously. One of the aims of my research is to get to grips with this, particularly now with the questions about batteries.

Kerstin Volz: I have always found it ex-

citing to understand the atomic structure of matter. Electron microscopy is a technique that allows you to do this and then study interesting materials such as batteries. The battery consists of many materials that collide and form interfaces. To understand how a battery works you need to know how it is structured. This is only possible however if you really dare to look inside and map individual atoms.

How do a professor of solid-state physics and a professor of solid-state electrochemistry get together?

Volz: Since I set up my working group more than ten years ago we have both met up at joint events in materials sciences

in Marburg and Gießen. Energy storage and the questions that Jürgen Janek was working on seemed interesting to me. To begin with we exchanged samples, we then started joint discussions and later projects. In mid-October for example we organised a meeting with about 20 scientists from our groups. Such meetings are important as we discuss the results of our research, look for new questions or consider how to start up new projects.

What does it take to achieve successful cooperation?

Janek: It was clear to both of us from the start that the best approach would be to set long-term and ambitious goals. You have to get on with your partner and it requires trust as we want to evaluate results together so that both sides benefit. It's even better if you understand one another without many words and have similar interests.

Was it like that at the beginning, that physics and chemistry could understand one another without many words?

Volz: Although we both come from the natural sciences, there are differences. At the beginning, it was challenging for us physicists that chemists always use abbreviations for battery materials. We had to learn these first. Both parties talk to one another often, approach things with humour and learn a lot from one another, which is important

Janek: We had to learn at the beginning that results did not always come as quickly as we had sometimes hoped. Don't forget, it took us ten years to get to this point. Not everything was easy. Since I have been coordinating the "FestBatt" Cluster of Competence for the German Ministry of Education and Research, we have worked on joint projects which give us third-party funding for cooperation. This makes the cooperation more professional.

What have been the highlights of your joint research?

Volz: For a long time it was a challenge to map the lithium ion in the storage material. This ion is very small and light,

but it is key for a battery because it communicates between the two electrodes. We have developed a method to make the ion visible. Now we can see for example that the battery works less well when the lithium ion is not where it should be.

Janek: It was important for me that my working group could better understand structural faults in materials which prevent the rapid transport of lithium ions. From the electron microscope images we could see at the atomic level that cracks formed on the cathode during the storage process which are fatal for battery performance.

And what has made you dedicate your time to this application?

Janek: I actually consider our research to be very fundamental, because some things need time before they become relevant in practice. However, it is highly relevant to society and makes you feel competitive when you know that there are other working groups around the world

competing to solve the same problem.

Volz: We are continually in the process of drawing an arc from the foundations to the application. We also owe society something, as a lot of money is being put into our research and we want to give something back. At the same time we are pleased that batteries will work better in future because of our research.

Mr Janek, you became a member of the Leopoldina this year. What do you expect from this?

Janek: The subject of energy is currently of great importance and is a controversial issue in society. As the Leopoldina has an advisory mission in politics, I hope that I can make a contribution with the results of our research.

■ THE INTERVIEW WAS CONDUCTED BY
BENJAMIN HAERDLÉ

► Greve Prize

The Leopoldina Greve Prize

The Greve Prize of the German National Academy of Sciences Leopoldina is awarded every two years and is financed by the Helmut and Hannelore Greve Foundation for Science, Development and Culture. With an endowment of 250,000 euros, it is presented to scientists and research teams working in Germany at universities, non-university research institutes or commercial enterprises. The focus is outstanding achievements in research in the fields of "natural sciences/medicine" and "technical sciences". The sculpture for the Greve Prize was designed by the artist Bernd Göbel from Halle (Saale)/Germany.

■ RED

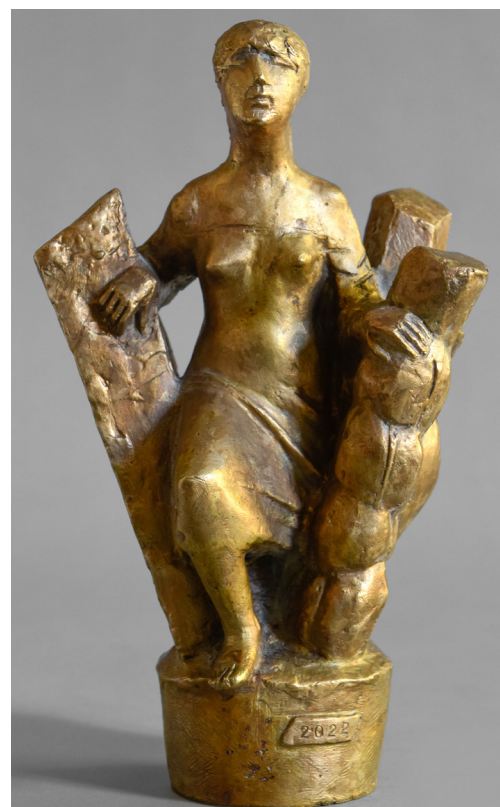


Image: Markus Scholz | Leopoldina

“Effective science advice builds on trusted national and international networks”

Part 4 in a series of articles on policy advice in the field of tension between science, politics and media

Molecular biologist Mona Nemer is Chief Science Advisor of the Canadian government. She was involved in the policy advisory process of the G7 science academies. For the series of articles, she writes about networks and partnerships in policy advice and Canada’s experience in the pandemic.

BY MONA NEMER*

This past summer, I had the honour of representing Canada at the G7 Science Ministerial in Frankfurt am Main/Germany. Among the many topics discussed were how to work together through science to address global challenges and promote peace and prosperity amid ongoing social and political strife in many parts of the world. This culminated in a communiqué that affirmed a collective commitment to support progress toward an equitable world, and to protect the freedom, integrity and security in science and research.

Developing policies to meet these global aspirations and commitments requires a well-organized science advice ecosystem both within and among nations. This includes, in addition to national and subnational science advisors, science academies, associations and international networks. Each plays a distinct and complementary role in gathering evidence, convening experts, and communicating with decision-makers and the public.

Effective science advice requires established trust and communication between science advisors and policy makers on the one hand and between scientists and the public on the other. Mobilizing the scientific community during an emergency is essential for evidence-informed policy and is greatly facilitated by networks and collaborations built in peace time. In Canada, the relations we built prior to the pandemic proved instrumental in setting

“We must maintain a respectful and constructive dialogue with the public to enhance their understanding of science and earn and maintain their trust.”

Mona Nemer

Molecular biologist and Chief Science Advisor of Canada

Image: Peter Thornton | Office of the Chief Science Advisor of Canada



up more than a dozen ad hoc groups of experts to advise the government on the evolving science of the new virus and its implication for managing the pandemic. Another grassroots effort brought together an extraordinary research community to rapidly disseminate credible knowledge to inform public health guidance and communicate with the public. The unprecedented mobilization of scientists shone a bright light on research.

At the international level, science advisors came together to share data, identify knowledge gaps and ensure the best advice to our respective governments. Early in the pandemic, we issued a collective call to scientific journals to immediately make all COVID-related research freely available to everyone, and this was realized within a few days. The value of openness cannot be overstated – not only in accelerating the pace of research, but in helping to empower the public to make informed decisions in the face of rising disinformation.

All the more reason, then, that the international science community should encourage sharing of best practices and the development of universally accepted principles for science integrity and research governance. Aligning our policies

to support equitable access to quality data and special infrastructure will accelerate discovery and promote the development of trusted networks and collaborations that will serve us well as we tackle global challenges. It will also help us be prepared and respond to future emergencies. As we strengthen science and science advice, we must maintain respectful and constructive dialogue with the public to enhance their understanding of science and, above all, earn and maintain their trust.

For over 50 years, Germany and Canada have benefitted from science and technology cooperation through an agreement that has effected more than a thousand joint research projects. Our bilateral relations are set to expand multilaterally when Canada joins Horizon Europe as an associate member. Let’s build on these invaluable assets and extend them to researching and sharing best practices of public communication and science advice. This will help our readiness to tackle the many global challenges ahead for the benefit of society.

* Mona Nemer is a molecular biologist and was Vice-President of the University of Ottawa/Canada until 2017, when she became Chief Science Advisor of Canada.

What should we talk about: Climate change, climate crisis or climate catastrophe?

Complex issues – a challenge for science communication and journalism

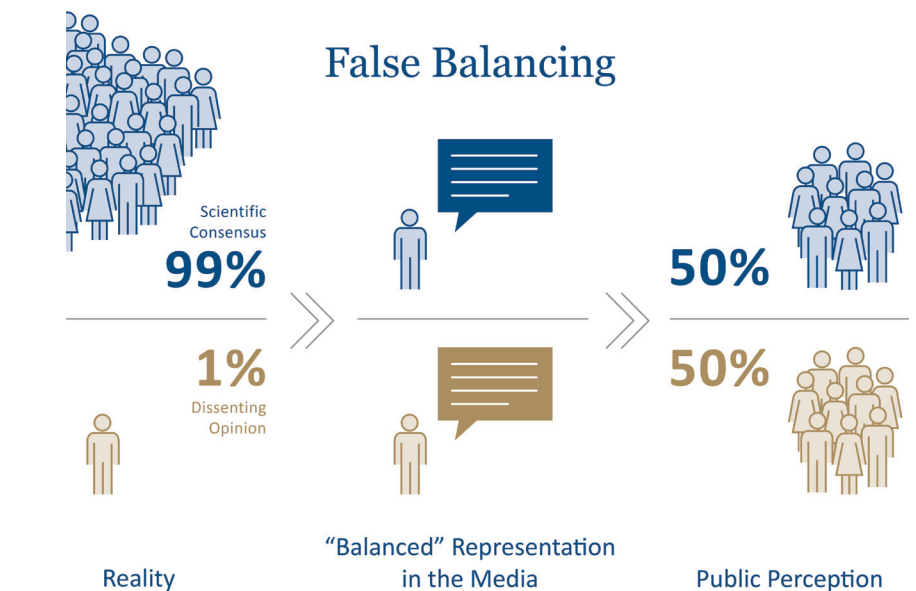
The COVID-19 pandemic, antibiotic resistance, climate change – research topics and findings that need to be explained to the public are often very complex. In addition, scientists have a different role to journalists. So how can a subject such as climate change be communicated across the board? And has anything been missed in the presentation and communication of the climate crisis over the last 30 years?

Science provides facts and shows options for action," emphasises Leopoldina Vice-President Robert Schlögl ML. „It does not have the task of lecturing people," he adds. The media also do not have an „educational mandate“. Rather, journalists select topics for reporting, classify, question and comment. However, it naturally plays a role how often and in what form a topic appears.

Have the media not reported climate change in the right way so far? This question was also discussed at this year's Leopoldina Journalist Collegium in Bremerhaven/Germany in September. "In our news programmes we have to cover current news, which sometimes means that it does not make the report," says editor Anja Martini. "And of course it is not easy to present the entire IPCC report in about 1 minute 30 – the standard length of new reports. But we still have to try."

The scientific community is often critical of some of the media for still allowing climate change deniers to have their say as experts of equivalent standing. An image of scientific knowledge is conveyed that reflects opinions and is not based on scientific evidence.

Journalists often discuss which images and terms should be used: Is "climate change" in fact the right term for what is happening? "We should be talk-



Science and the media have a different understanding of balance – this sometimes leads to evidence-based findings being presented in a truncated pro-contra-scheme.

Graphics: Sisters of Design | Leopoldina

ing about a climate catastrophe," says meteorologist and weather presenter Özden Terli on the ZDF television channel. "Climate change is too bland."

In his opinion, the topic should be taken up in fictional formats such as series, TV films and cinema films. Because: "The existential problem is not (yet) being taken seriously by society,

otherwise we would behave differently." Others fear that the term climate catastrophe is more likely to wear thin and that readers, viewers and users will become immune to it.

How do science communication and the media reach people? News editor (of Tagesschau) Anja Martini is convinced: "We have to explain a lot more without pointing fingers." New formats are now available for this purpose, she reports: The Tagesschau-online page has a knowledge section where all reports on the climate crisis can be found and since the beginning of November Tagesschau24 shows a 15 to 25 minute magazine show "KlimaZeit" every Friday before the regular news programme. "We want to explain the climate crisis in detail and present the latest results of climate research." For this, the media would need experts from the science community and their factual knowledge.

FACTSHEET CLIMATE CHANGE

The Leopoldina fact sheet "Climate Change: Causes, Consequences and Possible Action" presents knowledge about the causes and consequences of climate change in a generally understandable way. In addition, the role of tipping elements as well as aspects of emissions budgets and reductions are explained. The relationships and data are illustrated in a visual and compact form.



Factsheet

Science academies of the G20 countries present statement

Recommendations on health and climate protection / Outlook for Science7 and Science20 Processes 2023

The G20 Science Academies under the leadership of the Indonesian Academy of Sciences (AIPI) have presented a statement entitled “Recover together, recover stronger”. Leopoldina members were involved in the drafting process.

In addition to addressing the economic and social consequences of the COVID-19 pandemic, the joint recommendations focus on climate change and its impacts as well as global health challenges. The Russian academy was excluded from drafting the Science20 (S20) statement due to Russia’s war of aggression on Ukraine.

The handover of the statement to the Indonesian G20 Presidency took place during the Science20 Summit in Jakar-



ta/Indonesia on 20 September. The G20 summit met in Bali in mid-November. In 2023 India will take over the G20 Presidency. The Science20 Process will then be coordinated by the Indian National Science Academy (INSA), which has been a close strategic partner of the Leopoldina for many years.

During a Leopoldina delegate trip to Japan in October, one of the topics

was the planning for the Science7 Process 2023 during the Japanese G7 Presidency. A meeting with the Presidium of the Science Council of Japan (SCJ) took place in Tokyo.

Previously, representatives of the Leopoldina participated in the Science and Technology in Society (STS) forum in Kyoto. Leopoldina Vice-President Robert Schlögl, chemist and catalysis researcher, spoke on a panel on new energy technologies. Electrical engineer and computer scientist Sami Haddadin ML chaired a session on autonomous robotics.

■ CHW, KK, RN



[S20 statement](#)

Strengthening cooperation with South Korean academy

An additional protocol for bilateral cooperation was signed at a symposium in Seoul

With the symposium “Artificial Intelligence and the Digital Age” the Korean Academy of Sciences and Technology KAST and the German National Academy of Science Leopoldina celebrated the tenth anniversary of their bilateral cooperation in Seoul/South Korea at the end of September.

To mark the anniversary, both academies signed an additional protocol to the existing memorandum of understanding of 2012. “At the Leopoldina, we greatly appreciate the strategic partnership with KAST. We look forward to deepening our cooperation even further in the coming years,” said Leopoldina Vice-President Ulla Bonas ML in Seoul/South Korea.

The sixth joint symposium of KAST and the Leopoldina brought together renowned scientists from South Korea and



Leopoldina Vice-President Ulla Bonas and KAST President Ook Joon Yoo in Seoul after signing the additional protocol to the existing cooperation agreement.

Image: The Korean Academy of Science and Technology (KAST), 2022

Germany to discuss current trends in artificial intelligence research, technological progress and its impact on society. On the German side, Alexander Waibel ML was the scientific coordinator of the conference.

At the invitation of the German Ambassador to South Korea, Michael Reiffenstuel, both delegations also met for an

evening reception at the Ambassador’s residence to further strengthen German-Korean scientific relations. The next KAST-Leopoldina Symposium will be in Germany in 2023.

■ CHW



[Partnership Korea](#)

Senate elects Onno Oncken to the Presidium

Regina T. Riphahn re-elected Vice-President for Class IV

The Leopoldina Senate met for its regular meeting in Halle (Saale)/Germany on 22 September before the Annual Assembly.

At the meeting a decision was made to admit a new member to the Leopoldina Presidium. Onno Oncken ML (Potsdam/Germany) was elected as the new Secretary



Regina T. Riphahn was re-elected Vice-President, Onno Oncken is a new member of the Presidium. Images: Markus Scholz | Leopoldina, GFZ

of Class I: Mathematics, Natural and Technical Sciences. He succeeds Sigmar Wittig ML (Karlsruhe/Germany), who could not be re-elected after two terms in office. In addition, Regina Riphahn ML (Nuremberg/Germany) was re-elected

Vice-President for Class IV: Humanities, Social, Behavioural and Cultural Sciences for a second five-year term. The members of the Presidium are elected by the Senate, their term of office is five years, and re-election is possible once.

The Senate represents the interests of Leopoldina members before the Presidium. Its members are the elected Senators of the 28 Leopoldina Sections, representatives of members from Austria and Switzerland and five representatives of major scientific organisations (ex officio Senators) and five ad personam appointed Senators. ■ JB



Annual Assembly 2023

The status and the function of laws

The topic “Law(s): Rules of Reality – Rules for Reality” is the focus of the Annual Assembly 2023 of the Leopoldina. The proposed content came from Section 28 of the Leopoldina and will be prepared by Andreas Kablitz ML, Konrad Samwer ML and Andreas Voßkuhle ML. The starting point will be the question of the status and function of laws.

Following on from this, the different scientific cultures represented at the Leopoldina will be discussed with each other in a productive way.

The Annual Assembly will take place from 28 to 29 September in Halle (Saale)/Germany – which means that the conference will end on a Friday for the first time. The final event will be a panel discussion moderated by Andreas Voßkuhle. ■ PG



“GLOBAL HEALTH” IN THE FOCUS AT ANNUAL ASSEMBLY 2022



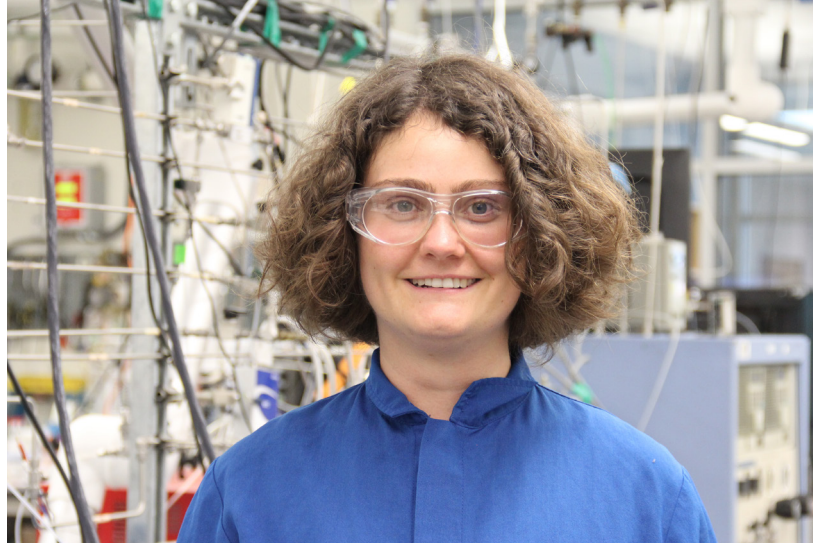
“Global Health: From health services to climate change and social justice” was the main topic of the Annual Assembly 2022 of the Leopoldina. The scientific coordination was carried out by the veterinarian and microbiologist Lothar H. Wieler ML, Senator of the Global Health Section, together with Susanne Hartmann ML and Thomas Mettenleiter ML.

“The ultimate goal of global health is to improve the health and equal opportunities of all people worldwide. This requires the cooperation of many disciplines,” said Leopoldina President Gerald Haug at the opening of the conference, which was attended by about 300 delegates. Over four sessions the social, economic, political and ecological aspects of health were presented and discussed. ■ DW

Images: Anna Kolata, Markus Scholz | Leopoldina

Leopoldina fellowships for postdocs

Jonathan Daume and Johanna Schröder are researchers at prestigious universities in California



The postdoctoral fellowship enables young researchers like Jonathan Daume and Johanna Schröder to pursue their studies on an international level.

Images: private

The Leopoldina supports postdocs with a two-year fellowship. A chemical engineer and a brain researcher are using this opportunity to further their studies at prestigious universities in California.

The COVID-19 pandemic also had an impact on the international exchange between researchers. This is what brain researcher Jonathan Daume discovered when he started his Leopoldina-funded position at Cedars Sinai Medical Center in Los Angeles/USA in spring 2020. "I was only in the office for two days before I was sent home," recalls Daume.

Short-term and long-term memory

In the lockdown Daume only got to know his new colleagues virtually. However, this did not affect his research too badly: The Medical Center had already collected a large amount of data from patients that Daume wanted to work with. He therefore spent most of the first year of his fellowship on his home computer analysing this data.

Jonathan Daume is researching the interaction between the short-term and long-term memory in the brain. How do

we consolidate the sensory impressions that we have every day and turn them into lasting memories?

At the Cedars Sinai Medical Center, epilepsy patients are studied by using electrodes inserted deep into their brain for several weeks. Daume uses this to stimulate their memory in seizure-free phases with test games on a laptop and to observe what happens in the relevant brain regions – especially the hippocampus and amygdala.

The electrodes can partially identify individual neurons that are involved in these memory processes. This would be impossible with other methods such as an EEG. In the meantime, Daume has been able to work with patients himself, and will continue his studies in Los Angeles after his Leopoldina postdoctoral fellowship expires.

Hydrogen as an energy carrier

Almost 600 kilometres further north, Johanna Schröder is researching the technical foundations for the energy industry of the future. She took up her post at the University of Stanford in April. Her work is about the production and consumption of hydrogen as an alternative energy carrier. The principle is: to use

renewable energies such as wind power and solar energy to split water into hydrogen and oxygen. The hydrogen can be stored and in fuel cells it later reacts with oxygen from the air back to water, thereby releasing the stored energy. Fuel cells can power large trucks for example.

Replacing rare elements

These two chemical processes are understood in principle, but the devil is in the detail: The reaction of oxygen is very slow, but metallic catalysts can speed up the process. At the moment, rare metals such as platinum and iridium are used for this. Schröder is working on replacing these elements with more common ones such as copper and nickel. The metals are used as nanoparticles to obtain the largest possible surface area.

The focus of this research is sustainability – there are simply not enough rare elements for the hydrogen economy of the future. There is also a problem of not becoming dependent on the few countries where these metals are mined.

■ CDR

► Fellowship programmes

People

Awards and Honours

■ **Michael Baumann** ML, Member of the Radiology Section, received an Honorary Doctorate in Health from the University of Aarhus (Denmark).

■ **Matthias Beller** ML, Member of the Chemistry Section, received the Luigi Sacconi Medal 2022 from the Department of Inorganic Chemistry of the Italian Chemical Society (Rome/Italy) and the Luigi Sacconi Foundation (Sesto Fiorentino/Italy).

■ **Carolyn R. Bertozzi** ML, Member of the Chemistry Section, received the Nobel Prize in Chemistry 2022 from the Royal Swedish Academy of Sciences (Stockholm/Sweden).

■ **Wolfram Burgard** ML, Member of the Informatics Section, received the “German AI Prize 2022” from the newspaper WELT and Axel Springer SE (Berlin/Germany).

■ **Lorraine J. Daston** ML, Member of the History of Science and Medicine Section, was awarded the Gerda Henkel Prize 2020 from the Gerda Henkel Foundation (Düsseldorf/Germany).

■ **Donald Bruce Dingwell** ML, Member of the Earth Sciences Section, was awarded the Willet G. Miller Medal 2022 of the Royal Society of Canada (Ottawa/Kanada).

■ **Ottmar Edenhofer** ML, Member of the Economics and Empirical Social Sciences Section, will assume the Mercator Professorship at the University Duisburg-Essen/Germany in 2022.

■ **Ute Frevert** ML, Member of the Cultural Sciences Section, was appointed new President of the Max Weber Foundation – German Humanities Institutes Abroad (MWS) by Bettina Stark-Watzinger, German Minister for Education and Research.

■ **Harald Fuchs** ML, Member of the Physics Section, was awarded the International Cooperation Award for Science and Technology of the People’s Republic of China.

■ **Peter Hänggi** ML, Member of the Physics Section, received the Lars Onsager Prize 2023 of the American Phys-

ical Society (APS) (College Park/USA).

■ **Gerald H. Haug** ML, Member of the Earth Sciences Section and President of the Leopoldina, was appointed Fellow of Class 2022 of the American Geophysical Union (Washington D.C./USA).

■ **Anthony Hyman** ML, Member of the Genetics/Molecular Biology and Cell Biology Section, received the Breakthrough Prize in Life Sciences 2023 of the Breakthrough Prize Foundation (New York City/USA).

■ **Stefan H. E. Kaufmann** ML, Member of the Microbiology and Immunology Section, was awarded the Ernst Hellmut Vits-Prize 2022 of the University Society Münster (Münster/Germany).

■ **Ursula Keller** ML, Member of the Physics Section, was awarded the Marcel Benoist Swiss Science Prize by the Marcel Benoist Foundation (Bern/Switzerland).

■ **Hans Keppler** ML, Member of the Earth Sciences Section, was awarded the Silver Abraham Gottlob Werner Medal 2022 of the German Mineralogical Society (Jena/Germany).

■ **Ottoline Leyser** ML, Member of the Organic and Evolutionary Biology Section, received the Croonian Medal and Lecture 2023 of the Royal Society (London/UK).

■ **Franc Meyer** ML, Member of the Chemistry Section, received the GDCh-Prize for Inorganic Chemistry of the German Chemical Society (Frankfurt am Main/Germany).

■ **Svante Pääbo** ML, Member of the Human Genetics and Molecular Medicine Section, received the Nobel Prize in Physiology or Medicine 2022 from the Nobel Assembly at the Karolinska Institute (Stockholm/Sweden).

■ **Stefan M. Pfister** ML, Member of the Gynaecology and Paediatrics Section, received the Baden-Württemberg State Research Award 2022 from the Ministry of Science, Research and the Arts Baden-Württemberg (Stuttgart/Germany).

■ **Frank Scherbaum** ML, Member of the Earth Sci-

ences Section, received an Honorary Doctorate from Tbilisi State Conservatory (Georgia).

■ **Bettina Schöne-Seifert** ML, Member of the Philosophy of Science Section, was appointed member of the Future Council of the German Government and the International Bioethics Committee of UNESCO.

■ **Markus Schwaiger** ML, Member of the Radiology Section was elected the new President of the Bavarian Academy of Sciences and Humanities (BAdW) (Munich/Germany).

■ **Jan Peter Toennies** ML, Member of the Physics Section, was awarded the Enrico Fermi Prize of the Società Italiana di Fisica (Bologna/Italy).

■ **Peter Wiedemann** ML, Member of the Global Health Section, was awarded honorary membership of the German Ophthalmology Society (Munich/Germany).

■ **Anton Zeilinger** ML, member of the Physics Section, received the Nobel Prize in Physics 2022 from the Royal Swedish Academy of Sciences (Stockholm/Sweden).

Deceased Members

■ **Sir Arnold Burgen** ML | 20 March 1922 to 26 May 2022 | Cambridge/UK | Physiology and Pharmacology/Toxicology Section

■ **Paul Kleihues** ML | 21 May 1936 to 17 March 2022 | Zürich/Switzerland | Pathology and Forensic Medicine Section

■ **Theodor Heinrich Schiebler** ML | 03 February 1923 to 27 August 2022 | Würzburg/Germany | Anatomy and Anthropology Section

■ **Dagmar Schipanski** ML | 03 September 1943 to 07 September 2022 | Ilmenau/Germany | Technical Sciences Section

■ **Maarten Schmidt** ML | 28 December 1929 to 17 September 2022 | Fresno/USA | Physics Section

■ **Michael Sela** ML | 02 March 1924 to 27 May 2022 | Rehovot/Israel | Microbiology and Immunology Section

■ **Vince Varró** ML | 13 October 1921 to 19 December 2021 | Szeged/Hungary | Internal Medicine and Derma-

tology Section

■ **Josef Zemann** ML | 25 May 1923 to 16 October 2022 | Vienna/Austria | Earth Sciences Section

Leopoldina Fellowship Programme New fellows

■ **Dr. Dorothee Bornhorst-Ohmstede** from the Hanover Medical School (MHH), Hanover/Germany has been conducting research with Dr. Leonard Zon in the Stem Cell Program at Boston Children's Hospital/Harvard Medical School in Boston/USA since March 2021 on a 24 month programme.

■ **Dr. Patrick Burael** from the Max Planck Institute (MPI) for Intelligent Systems in Tübingen/Germany began a 24 month project in September 2022 at Caltech in Pasadena/USA in the working group of Prof. Dr. Frederick Eberhardt.

■ **Dr. Johannes Dietschreit** from the Theoretical Chemistry Department at Ludwig-Maximilians-University of Munich/Germany started working on a 24 month project at the Department of Materials and Engineering Sciences at Massachusetts Institute of Technology (MIT), in Boston/USA with Prof. Dr. Rafael Gómez-Bombarelli in July 2021.

■ **Dr. Sofya Dolotovskaya** from the German Primate Center, Göttingen/Germany started a 24 month project with Prof. Dr. Anthony Di Fiore from the Department of Anthropology at the University of Texas at Austin/USA in May 2022.

■ **Dr. Andreas Elben** from the Institute for Quantum Optics and Quantum Information (IQOQI) at the University of Innsbruck/Austria has worked since April 2021 on a 24 month project at the Institute for Quantum Information and Matter (IQIM) of the California Institute for Technology (Caltech) in Pasadena/USA with Prof. Dr. John Preskill.

■ **Dr. Serap Erdogmus** from the Walther Straub Institute of Pharmacology and Toxicology at the Ludwig-Maximilians-University of Munich/Germany began her 24 month project in the Department of Pathology of the New York University Grossman School of Medicine in New York/USA with Prof. Dr. Stefan Feske in August 2021.

■ **Dr. Eric Görlitzer**, more recently the Chair of Solid

and Interfacial Process Engineering at the Friedrich Alexander University of Erlangen-Nuremberg/Germany, moved in May 2022 for 24 months to the Cavendish Laboratory at the University of Cambridge/UK to the working group of Prof. Dr. Jeremy J. Baumberg.

■ **Dr. Norah Hoffmann** from the Max Planck Institute (MPI) for Structure and Dynamics of Matter in Hamburg/Germany is continuing her 24 month research project started in September 2021 at the Department of Chemistry at Columbia University in New York/USA with Prof. Dr. Timothy C. Berkelbach.

■ **Dr. Felix Kögler** left the Center of Astronomy & Astrophysics at the Technical University of Berlin/Germany in October 2021 for 24 months for the field of Isotopes and Experimental Biogeochemistry at the Institute of Earth & Environment Strasbourg/France with Dr. habil. Gwenaël Imfeld.

■ **Dr. Antonie Lechner** from the Center of Allergy and Environment, Technical University of Munich and the Helmholtz Center Munich/Germany will join Prof. Dr. Christoph Schneider at the Institute of Physiology at the University of Zürich/Switzerland for 24 months in 2023.

■ **Dr. Lars Longwitz** from the Institute of Agricultural Sciences at the University of Rostock/Germany started a 24 month project at the Stratingh Institute for Chemistry at the University of Groningen in Groningen/the Netherlands with Prof. Gerard Roelfes in October 2021.

■ **Dr. Robert Mieth** vom from the Department of Control Systems at the Technical University of Berlin/Germany will be working for 24 months at the Department of Electrical and Computer Engineering at Princeton University in Princeton/USA, with Prof. Dr. H. Vincent Poor from November 2022.

■ **Dr. Johannes Mitscherling** from the Max Planck Institute (MPI) for Solid State Research in Stuttgart/Germany will work for 24 months at the Department of Physics of University of California at Berkeley/USA with Prof. Dr. Joel E. Moore from September 2022.

■ **Dr. Niclas Müller** from the Institute for Experimental Physics of the Physics Department at the Free University Berlin/Germany went to the EPSRC NanoPhotonics Centre at the Cavendish Laboratory of the University of Cambridge/UK to work with Prof. Dr. Jeremy J. Baumberg for 24 months in May 2021.

■ **Dr. Julian Packheiser** previously at the Department of Biopsychology at the Institute of Cognitive Neuroscience of the Ruhr University Bochum/Germany has been working on a 24 month project at the Social Brain Lab at the Netherlands Institute for Neuroscience at the Royal Netherlands Academy of Sciences in Amsterdam/the Netherlands with Prof. Dr. Christian Keysers and Dr. Valeria Gazzola since July 2021.

■ **Dr. Sarah Pederzani** from the Department of Human Evolution at the Max Planck Institute for Evolutionary Anthropology in Leipzig/Germany travelled to the Archaeological Micromorphology and Biomarker Research Lab (AMBI Lab) at the Universidad de La Laguna in Tenerife/Spain in February 2022 for a 24 month research project with Prof. Dr. Carolina Mallol.

■ **Dr. Keerthana Rajes** from the Department of Organic and Macromolecular Chemistry at the Free University Berlin/Germany will go to the Riken Institute in Saitama in Tokyo/Japan in November 2022 for 12 months to the working group of Prof. Dr. Tazudo Aida.

■ **Dr. Johanna Schröder** left the Department of Physical Chemistry at the Department of Chemistry, Biochemistry and Pharmaceutical Science of the University Bern/Switzerland to join Prof. Dr. Thomas F. Jaramillo at the Shiram Center in the Department of Chemical Engineering at Stanford University/USA for 24 months from April 2022.

■ **Dr. Philipp Stegmann** from the Department of Theoretical Physics at the Department of Physics of the University of Duisburg-Essen/Germany has been working since May 2021 on a 24 month project at the Department of Chemistry of Cambridge University, in Cambridge/USA with Prof. Dr. Jianshu Cao.

■ **Dr. Lilian Sophie Szych** from the Department of Chemistry at Technical University of Braunschweig/Germany started a 24 month project in Inorganic Chemistry at the Department of Chemistry at the University of Oxford/UK in the working group of Prof. Dr. Jose M. Goicoechea in October 2022.

■ **Dr. Agnes Ulfig** from the Institute of Biochemistry and Pathobiochemistry at the Ruhr University Bochum/Germany has worked since March 2021 on a 24 month project at the Department of Biological Chemistry of the University of Michigan Medical School in Ann Arbor/USA with Prof. Dr. Ursula Jakob ML.

■ **Dr. Nora Weickgenannt** from the Institute of Theoretical Physics at the Goethe University in Frankfurt am Main/Germany has chosen the Institut de Physique Theoretique at Paris-Saclay Université in Gif-sur-Yvette in France with Prof. Dr. Jean-Paul Blaizot for her 24 month project from January 2023.

■ **Dr. Philipp Zuber** from the Chair of Biochemistry at the University of Bayreuth/Germany began a 24 month project in January 2022 at the MRC Laboratory of Molecular Biology in Cambridge/UK in the working group of Prof. Dr. Venki Ramakrishnan ML.

Former Fellows

■ **Prof. Dr. Sebastian Beil**, fellowship from 2020 to 2021, has been Assistant Professor for Electrochemical Synthesis and Catalysis at the University of Groningen/the Netherlands, in the Department of Science and Engineering since May 2021.

■ **Prof. Dr. Rolf Kuiper**, fellowship from 2011 to 2012, has been a new Professor of Theoretical Physics with a focus on planetary research at the University of Duisburg-Essen/Germany, Department of Physics, since July 2022.

■ **Prof. Dr. Dr. Alpaslan Tasdogan**, fellowship from 2017 to 2019, has been Professor for Tumour Metabolism at the Clinic for Dermatology at the University Hospital Essen/Germany since autumn 2021. He was also awarded the Oscar Gans Prize 2021 by the German Dermatological Society.

■ **Prof. Dr. Johannes F. Teichert**, fellowship from 2011 to 2013, has been Professor of Organic Chemistry at Chemnitz University of Technology, Chemnitz/Germany since the end of 2021.

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Abbreviations:

ML = Member of the Leopoldina