



Leopoldina  
Nationale Akademie  
der Wissenschaften

# Leopoldina news

1/2023

Deutsche Akademie der Naturforscher Leopoldina –  
German National Academy of Sciences

Halle (Saale), 3 March 2023



## Research in Times of Global Change

**Report on Tomorrow's  
Science and Symposium  
on Earth System Science**



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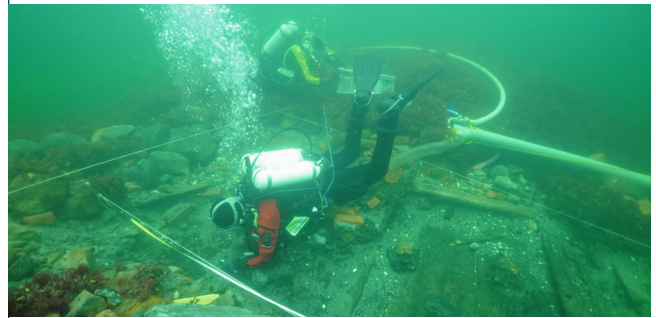
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**Ad-hoc advice:** Policy advice reacts to the need for more rapid work processes and sets up focus groups

The Leopoldina on Social Media



# Editorial

Dear Members and Friends of the Leopoldina,

At the end of last year we heard some good news. The World Biodiversity Summit COP15 in Montreal, Canada, ended with an ambitious international agreement: 30 percent of land and marine areas are to be protected by 2030.

This agreement in December should motivate us to pool the results of our research this year so that public debates and political decisions can be based on current scientific findings. In addition, newly formed focus groups at the Leopoldina will monitor where consultancy is needed. So far three groups have been set up on the topics of biodiversity/land use/climate, climate and energy, and medicine, and a fourth on digitalisation is currently being established. Group members regularly exchange information and if necessary initiate the transfer of knowledge to the public and politics (see p. 8).



*Professor (ETHZ) Dr Gerald Haug, President of the Leopoldina*

*Image: David Ausserhofer | Leopoldina*

There are also established working groups, which are able to explore topics in greater depth over a longer time period. A great example of this is the working group “Archaeological Cultural Heritage”, which brought out its third publication in February, this time on the subject of emergency protection of cultural assets (see p. 6 and 7). Other working groups also continue to develop activities at the Leopoldina. Thus, the publication of the Report on Tomorrow’s Science “Earth System Science – Discovery, Diagnosis, and Solutions in Times of Global Change” provided impetus for the symposium “Earth System Science: A new concept for geosciences”, which brought lively discussion to Halle just before Christmas. And we hope to continue these discussions in an equally lively manner this year (see p. 4 and 5).

I hope you find this a stimulating read!

A handwritten signature in blue ink, which appears to read 'Gerald Haug'.



# Starting signal for future-oriented Earth System Science

Networking, funding, training: Debate on a new concept for geosciences



*Transdisciplinary and digital work, institutional networking, new infrastructures for Big Data as well as university training on the concept of Earth systems – Earth System Science is looking for modern answers for an Earth in transition.*

*Image: metamorworks | AdobeStock*

**In order to counter climate change, the individual disciplines within the geosciences need to network more effectively across disciplines and institutions.**

The Report on Tomorrow's Science "Earth System Science – Discovery, Diagnosis, and Solutions in Times of Global Change", published by the Leopoldina in summer 2022, has given important impetus to this debate. At a symposium in Halle (Saale)/Germany in December 2022 the considerations

of the expert community were defined in more detail.

The fact that the planet is struggling is no longer subject to much debate. Rapid solutions are needed to slow down climate change, protect ecosystems on land and in the seas, use natural resources sustainably and predict natural hazards. To prepare for these challenges, we need an Earth System Science which brings together the whole spectrum of geosciences – this is the key message of the Report on Tomorrow's Science. What the expert community thinks of this new idea became clear at the Leopoldina

symposium in Halle (Saale)/Germany in December 2022.

"It was a fantastic debate", concluded Onno Oncken ML, one of the writers of the Report on Tomorrow's Science. "It showed that not only is there a need for urgent action to increase the potential of geosciences, but also that there is a huge amount of interest in this", summarised the Visiting Professor at the Helmholtz Centre Potsdam – German Research Centre for Geosciences.

Susanne Crewell ML, Professor of Meteorology at the University of Cologne/Germany, also took part in the symposium.



sium. “The Report on Tomorrow’s Science is particularly important for external recognition, as due to the large number of smaller scientific disciplines within the geosciences they are not always seen to speak with one voice and their message often does not get through”, is her assessment. At the same time we need these individual disciplines in order to understand Earth systems and to predict processes. “We need to make sure we don’t lose our expertise in the finer details, that is the crux of the matter”, she warned.

### Boost to funding

Crewell also advocated for closer international networking for Earth observation systems, and other disciplines such as computer science. “The geosciences already use many methods taken from computer science, such as machine learning, in remote sensing for example, but this has often been developed by other disciplines”, said the meteorologist. “If we work more closely together the geosciences could also be in the driving seat, for the development of algorithms for example.”

The Leopoldina initiative has received generous funding from the Volkswagen

Foundation who plans to invest ten million euros into this field. “The Report on Tomorrow’s Science for Earth System Science immediately convinced us of the relevance and urgency of this field of research. People have become accustomed to basic research becoming increasingly specialised and more and more focused in scope – and forget to look at the Earth as a whole”, says Georg Schütte, General Secretary of the Volkswagen Foundation. But effective solutions to global problems can only be found from the systematic perspective.

The Foundation will support six junior professorships with funding of 1.5 million euros each for the next six years. After that universities will need to take over the funding. “We want to stimulate modernisation and bring dynamism to the geosciences. Our aim is to realign the many subdisciplines based on the future-oriented idea of Earth System Science”, explained Schütte.

However, this process will not proceed without friction. “Developing scientific disciplines is a challenge because you have to scrutinise everything”, said Schütte. Particularly as the geosciences have a total of 26 professional societies.

“There needs to be an incentive to carry out the necessary process, and we also need to be patient.”

How such change can be brought about at universities was explained at the symposium with reference to examples of best practice, such as the Global Futures Laboratory at Arizona State University/USA or the Center for Earth System Research and Sustainability (CEN) at Universität Hamburg/Germany. “At CEN, greater integration of Earth sciences has made it possible to bring expertise together in one department and to very successfully acquire third-party funding such as the Cluster of Excellence funding line from the German Research Foundation”, reported Onno Oncken.

Another possibility would be to add components of Earth System Science to the curricula of geoscience degree courses. However, “there is no ‘one size fits all’ solution. Local framework conditions will play an important role.”

### Communication and networking

In his summary of the conference Oncken added further tasks to the list, such as a national roadmap for the development of observation systems and a white paper for the expansion of digital infrastructures.

However, the geologist and Member of the Leopoldina Presidium is not only concerned with uniting the geosciences. “We need to deal with fragmentation, so that we can be seen to speak to the public more effectively with one voice”, he added, making an equally important point. He envisages the first step to be workshops with subject representatives from Earth System Science and adjacent disciplines and other stakeholders, initiated by Leopoldina.

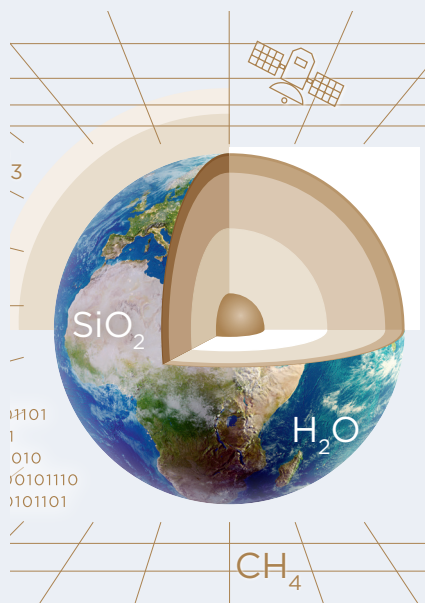
As part of its ten million euros funding initiative, The Volkswagen Foundation has earmarked a million euros to support networking and debate in the research community is greatly welcomed for this reason. The Volkswagen Foundation provided online information about the new funding programme back in February. Oncken: “This is the starting signal, we now have to set it all in motion.” ■ BJH

## REPORT ON TOMORROW’S SCIENCE – EARTH SYSTEM SCIENCE

In order to understand the Earth as a whole and effectively contribute to solving global challenges, in future the geosciences in Germany need to be modernised and shaped by the concept of Earth System Science. This is recommended by the German National Academy of Sciences Leopoldina in their Report on Tomorrow’s Science “Earth System Science – Discovery, Diagnosis, and Solutions in Times of Global Change”. The report gives an overview of the research field and proposes measures for establishing the concept.

In their “Report on Tomorrow’s Science” series Leopoldina addresses issues of medium and long-term scientific development which are relevant to the relationship between science, politics and society.

■ RED



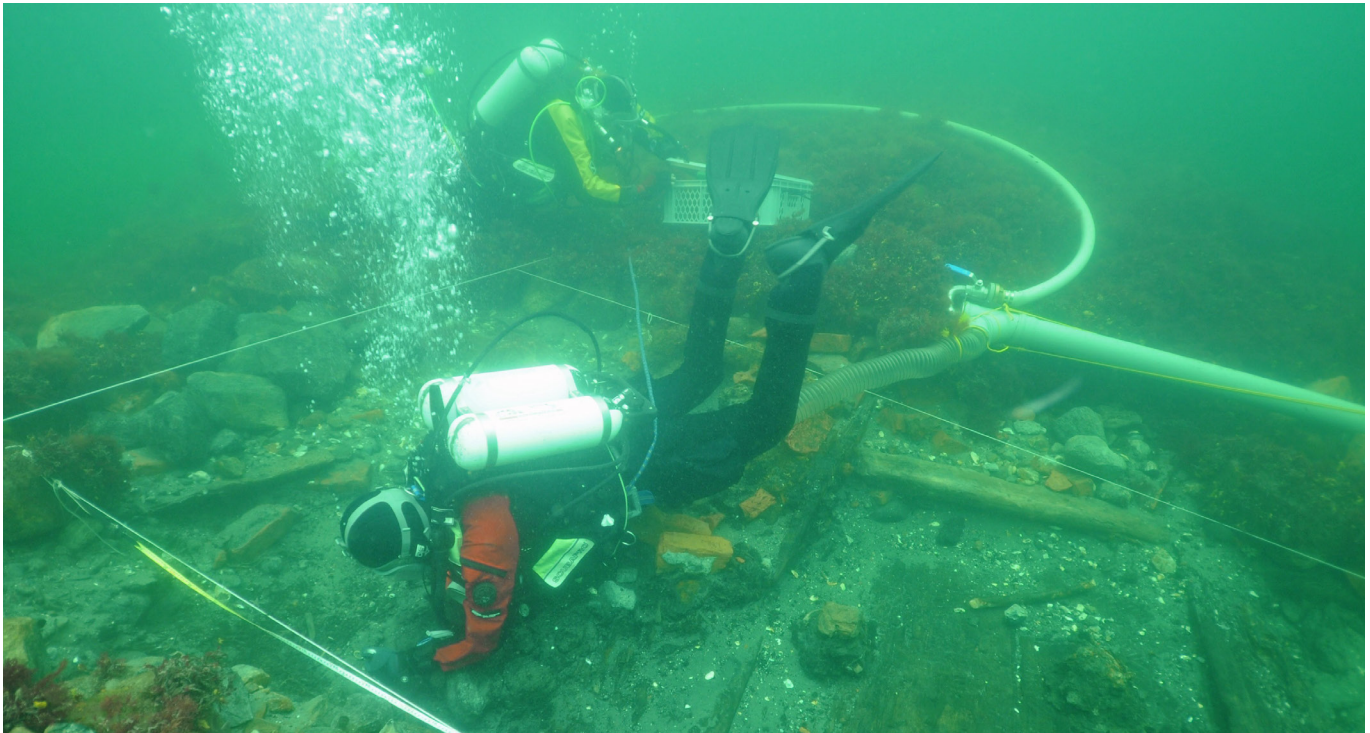
Report on Tomorrow’s Science – Earth System Science



# Archaeological Cultural Heritage

## “The legal situation is complicated”

Leopoldina Member Hermann Parzinger on activities and results of the working group



The North and Baltic Seas are home to archaeological sites such as the wreck of the Swedish warship “Prinsessan Hedvig Sophia” which sank close to Kiel/Germany in 1715. The Leopoldina working group discussed how to protect these cultural assets.

Image: Gerhard Lorenz, Wendtorf, and F. Wilkes | Lower Saxony Institute for Historical Coastal Research

**Two new discussion papers have been published by the Working Group on Archaeological Heritage. Hermann Parzinger ML, archaeologist and president of the Prussian Cultural Heritage Foundation, comments on these and upcoming activities.**

*How did the working group come into being, and what disciplines do the members come from?*

**Hermann Parzinger:** When the working group was set up, we were all affected by the Islamist-motivated cultural destruction in the Middle East and in Mali. We wanted to focus on archaeological cultural heritage while also shining a light on as many aspects of the topic as possible. Of course, most members of the working group are archaeologists and antiquar-

ians, but it also includes lawyers and international lawyers, as the legal situation is always an important consideration. There are also cultural heritage specialists, and for some topics we have brought in writers who are not permanent members.

*How did the working group decide on the topics it wanted to work on?*

**Parzinger:** The core group, which at the beginning consisted of antiquarians and a lawyer, got together and defined the main issues very quickly. Together with representatives of heritage conservation here in Germany and the German Archaeological Institute with its foreign perspective, we soon agreed on the topics we should address as a matter of priority, from the emergency protection of looted excava-

tions and illegal trade in antiquities to the role of minor disciplines, whose expertise is indispensable for issues of cultural preservation. Then the topics developed and broadened organically, as in the case of underwater archaeology in the North and Baltic Seas, which led to a discussion paper.

*The discussion paper “Traces under Water” from 2019 has resonated not only with experts in the field but also with the media. In your opinion what are the most important insights from the paper?*

**Parzinger:** It is significant that this publication really points out the importance of underwater cultural heritage. This concerns entire settlement landscapes from the Mesolithic period, which have sunk



due to fluctuations in the sea level as well as land uplift and subsidence, and are not that far from the coast. It also covers shipwrecks from the Middle Ages to the last two world wars which must be suitably protected and not be plundered.

A further question is how to deal with this “Exclusive Economic Zone” (EEZ) beyond the territorial sea. How can cultural assets be protected when building offshore wind farms, or from looting of the excavations? How can underwater archaeological research be supported, also in cooperation with neighbouring states? And how can it be linked to marine science research? How can the rules be better applied, such as the UNESCO Convention on the Protection of Underwater Cultural Heritage of 2001, which Germany has still not ratified? This is the field that we wanted to draw attention to with our proposals.

*Another field that you highlighted in a recently published discussion paper is the legal basis of emergency protection for cultural assets. What still needs working on in terms of precautionary measures in*

*the event of natural disasters, terrorist attacks or war?*

**Parzinger:** The legal aspects are complicated: International law in peace time and in the event of war, European law and the legal situation in Germany. In the discussion paper the writer we engaged for this purpose, Kerstin von der Decken, tries to describe the gaps in the regulations and make suggestions on how to harmonise the legal differences and make improvements. In doing so she clearly illustrates that Germany needs to take action itself, mainly to bring the competences of the federal and state governments more in line with one another.

*What other issues are you concerned about?*

**Parzinger:** Climate change also poses a significant threat to archaeological

heritage. In this respect I can refer to my experience of the permafrost zone in Siberia, where water deposits in Iron Age burial mounds have preserved deceased persons with all of their organic burial items in an ice lens for two and a half thousand years, like a snapshot of the past. Global warming threatens to cause the loss of unique cultural assets not only in this area.

Another topic we would like to address is illegal excavations. This is not only a problem in the Middle East or in South America, but is also a very serious threat to our cultural heritage here in Germany. Just think about the Nebrasky disc, one of the most important archaeological finds of recent decades: It comes from a looted excavation in Saxony-Anhalt.

■ THE INTERVIEW WAS CONDUCTED BY  
ADELHEID MÜLLER-LISSNER

- ▶ Working group “Archaeological Cultural Heritage”
- ▶ Discussion paper “Legal Basis” (German only)
- ▶ Discussion paper “Organisational Requirements” (German only)

## NEW CLASS I MEMBERS – MATHEMATICS, NATURAL SCIENCES AND ENGINEERING



*In February the newly elected Class I members of 2019, 2020, 2021 and 2022 – Mathematics, Natural Sciences and Engineering – received their certificates. In the image: Leopoldina President Gerald Haug ML (centre front) and the new Members – front row (from the left): Nicola A. Spaldin ML, Muriel Médard ML, Ulrike von Luxburg ML, Sir Richard Catlow ML, Barbara Wohlmuth ML, Gisela Lanza ML, Ben Feringa ML. In the back row (from the left): Thomas Stocker ML, Peter Bühlmann ML, Martin Grosjean ML, Jürgen Janek ML, Donna G. Blackmond ML, Adrian Constantin ML, Michael Kaschke ML.*

*Image: Markus Scholz | Leopoldina*



# Focus groups broaden Leopoldina policy advice

Key features and interdisciplinary panels of science-based advice



Members of Leopoldina regularly confer with one another in committees and at events concerning the future of science.

Image: Anna Kolata | Leopoldina

**The German National Academy of Sciences Leopoldina advises policy makers and the public on societal issues that require science-based analysis.**

For this, interdisciplinary groups of researchers write papers which present scientific content in a comprehensible way and make it as accessible as possible. These can be statements, discussion papers, future reports or factsheets. In this way the Leopoldina contributes to ensuring that political decisions can be made on the basis of reliable scientific findings. By organising complementary events it promotes informed public dialogue.

The Leopoldina is free to choose its own topics. Depending on the topic, the Leopoldina can cooperate with other academies and scientific institutions, with public institutions and with

international partner institutions.

In order to be able to react more quickly to societal challenges, the Leopoldina has also set up focus groups to complement the scientific commissions and working groups. The experience of the COVID-19 pandemic has made it clear that there is a great need for faster working processes and a permanent advisory infrastructure for the short-term development of analyses and options for action. Firstly, the Leopoldina Presidium set up four focus groups on the topics of

biodiversity and land use, medicine, climate and energy, and digitalisation. Focus groups continuously monitor developments in their respective subject areas and identify current needs for advice. If necessary, they produce publications at short notice – also with the involvement of other experts.

This form of ad-hoc advice does not replace the in-depth study of topics. Rather, the focus groups complement the work of the scientific commissions. Scientific commissions help to shape interdisciplinary discussion over the long term, identify important topics for the future and expand on them in symposia and workshops. For topics that require more in-depth study, more working groups are set up, which make scientific research available for public discussions and political measures in the form of statements, and identify options for action to tackle societal challenges. ■ RED

## INTERDISCIPLINARY COMMITTEES FOR SCIENCE-BASED CONSULTATION

- Focus group** Ongoing and regular discussion of current developments in a larger research field and consultation on specific, pressing issues in society
- Scientific Commission** Long-term monitoring of scientific discourse and the public debate on a comprehensive topic as well as initiation of working groups and organisation of events on specific topics
- Working Group** Development of a detailed statement on a specific topic relevant to society with the development of options for action within about one to three years



Science – Policy – Society



Rules for dealing with conflicts of interest

# Communication in times of multiple crisis

Joint Academy Day with Austrian Academy of Sciences



The Austrian Academy of Sciences and the Leopoldina invited discussions at the Joint Academy in Vienna/Austria.  
Images: Hinterramskogler | ÖAW, Graphics: ÖAW

**The debate about the role of science in forming democratic opinion and intention will continue after the COVID-19 pandemic has subsided. Scientific institutions in the public eye, such as the National Academies of Austria and Germany, need to help shape this discussion. The Joint Academy Day on the topic “Science Communication in Times of Multiple Crisis” in Vienna/Austria on 1 February set a clear tone.**

Science should inform policy as comprehensively as necessary, but legitimise it as little as possible – one of the key statements of the “Vienna Theses on science-based advice to politics and society”, which the Austrian Academy of Sciences (ÖAW) and Leopoldina had jointly prepared for the Joint Academy Day as a basis for discussion.

In their talks, the two Academy Presidents, Heinz Faßmann and Gerald Haug ML, clearly explained the separation between advising and decision-making in their advisory activities. Otherwise,

the Academies, which are independent of individual political interests, would jeopardise trust in science, which is still high. This trust is becoming increasingly important in a society looking for fact-based guidance but is also in part sceptical about science.

How science should make specific use of its space for communicating with society was the main question of the panel discussion at the Joint Academy Day, in which Leopoldina Members Michael Hallek ML and Christoph M. Schmidt ML took part. Differentiation was a keyword which came up frequently: The Academies would also be well advised to develop specific formats for the target groups to which they have the best access and to identify particularly relevant content. ■ ART



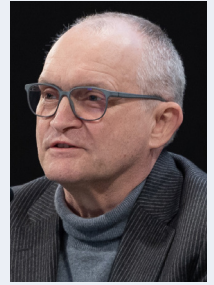
Vienna theses on science-based advice to politics and society

## FROM THE DISCUSSION

**Christoph M.**

**Schmidt ML:**

“We do not communicate the limits of our knowledge sufficiently, do not emphasise possible sources of error strongly enough and do not ask ourselves firmly enough what we can see and what remains closed to us. Communication must follow the principle of being as simple as possible, and as complex as necessary, but keeping this up is challenging. It is hard to express yourself simply and still be precise.”



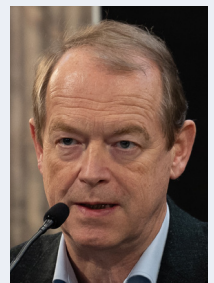
**Ricarda Winkelmann:**

“Knowledge needs to be accessible to everyone, not just the publications but also the data, methods and scientific approaches

behind them. We also need to communicate and classify the limits of our knowledge. And we need to rethink time – the climate crisis in particular demands longer-term thinking. The collective action of the next few years has the potential to change the face of the Earth for centuries or even millennia.”

**Michael Hallek ML:**

“As scientists, we need to communicate more, not less. And we need to communicate in such a way that people understand us and find us credible. This is trivial but it has often failed – during the COVID-19 pandemic, too. We should also try not to contribute to the ‘false balance’ ourselves. By that I mean only talking about things that we, as scientists, really know something about.”





# European responses to climate change and transformation

Leopoldina and the Polish Academy of Sciences launch the European Climate Conference



*Human intervention in the Earth's systems has caused serious changes to geology, climate and biodiversity. From mining for mineral resources, such as coal, the landscape, ground water systems and flora and fauna have been permanently destroyed. The climate in the region is also changing.*

Image: mitifoto | AdobeStock

**Climate change and its impact on Europe are the topic of the first European Climate Conference on 15 and 16 May in Warsaw. Leopoldina and the Polish Academy of Sciences invite discussion on the regionality of climate change and its consequences from the perspective of science. The starting point for this is the concept of the Anthropocene concept, co-created by the Nobel Prize winner and Leopoldina Member Paul J. Crutzen.**

Climate change caused by human activity is completely changing the Earth. The effect of humans, which is evident in this and other processes, led to the formation of a new geological epoch – the Anthropocene. The term was introduced by the Dutch atmospheric researcher Paul J. Crutzen together with US biologist Eugene F. Stoermer.

Due to its magnitude, climate change is seen as the global challenge of the 21st century. It involves far-reaching transformations in order to adapt to and mitigate the consequences of climate change to secure the survivability of humans and nature in the future. Furthermore,

the Russian war against Ukraine has changed the way climate change is dealt with on the European continent, especially in the context of the energy transition.

At this time of permanent crises, climate change remains a central problem that requires national, European and international efforts. Despite its extremely high relevance, it has not yet been given the necessary attention at regional and local level.

In view of this complexity the goal of the European Climate Conference is also complex: Inspired by the integrative-systemic approach of the Anthropocene concept, the conference aims to discuss the latest results of climate research and necessary changes in the interconnected natural, social and economic systems, while at the same time identifying regional differences and European commonalities. For this, the conference in Warsaw on 15 and 16 May will bring together leading scientists from 47 European and Eurasian countries.

The programme includes a public event: the Crutzen Anthropocene Distinguished Lecture. This will be given by Thomas Stocker ML, a world-leading climate researcher. In the following panel

discussion “The Planet and Us – Dos and Don’ts” current issues relating to climate research, sustainability, biodiversity and energy transition will be discussed. The conference will then be organised into a range of topics in which regional and supranational perspectives on climate change as well as sectoral transformations will be discussed, for example in the fields of energy, mobility, agriculture and construction.

The European Climate Conference seeks to build a bridge between interdisciplinary insights on the one hand and society, the economy and politics on the other. Climate change, its consequences and previous (political) transformation strategies will be classified scientifically and evaluated with a view to the future.

As a result, an attempt will be made to present the Warsaw Communiqué on Climate-Change Induced Transformations. This aims to promote science communication around the topic and improve decision-making for citizens, politics and the economy as a whole.

■ LB, SWE

▶ European Climate Conference

# Research Summit 2023: Remove blockades, use opportunities

Guest article by Uwe Cantner, Chairperson of the Expert Commission on Research and Innovation

**At times of crisis, we generally call for the state to act as the problem solver. Reactions to the COVID-19 pandemic as well as the war of aggression in Ukraine are evidence of this. Hope that the state will act as a problem solver by having a strong research and innovation policy (R&I) still exists for the transformations to come. However, these will still need to be orchestrated.**

BY UWE CANTNER \*

Discussions about the energy and mobility transition as well as the struggle for political initiatives to maintain technological sovereignty in key technologies have one thing in common: Their solution requires a multitude of technological and social innovations. These are often from different fields and need to interact effectively in terms of content and timing. How can this be achieved? In these discussions, prominent international voices such as Marianna Mazzucato and Dani Rodrik represent the position of a very strong state that creates entirely new markets and acts in terms of industrial policy with its own commitment to innovation (for profit). Economy and society are not given much involvement in this area.

Indeed, a state à la Mazzucato and Rodrik can drive essential technological developments itself through entrepreneurialism and prescribe behavioural changes by regulation. However, in doing so it will stifle the creativity and engagement of companies and society. It is questionable whether a state can do without these qualities over the long term.

A better solution is a state which skilfully initiates changes in direction by way of a New Mission Orientation and trusts in the cooperation and creativity of actors in the economy and society. It thus sets clear goals (missions) for the

necessary changes of direction that have been agreed together with society. These missions indicate future economic opportunities for (often new) companies.

A central task of the state is to formulate these missions in a way that is open to technology and thus open to results. When implementing them, however, it relies on the creativity, innovation and problem-solving ability of private actors and thus on market-based mechanisms of competition. The state can provide support to get activities going in these directions. For example, through the targeted public procurement of new technologies. Temporary protective measures for young technology and industries also help them take their first steps in competition. It is important that the interventions are catalytic, i.e. that they have a knock-on and accelerating effect and are then withdrawn. They must not develop into permanent interventions.

For these major projects to be successful, the state has to be strategically clever. Designing missions and accompanying transformation requires a governance structure, which develops and



*“The state needs to be strategically clever with regard to research and innovation policies and resist the temptation to call the tune.”*

Uwe Cantner  
Chairperson of the Expert Commission on Research and Innovation

*Image: David Ausserhofer | EFI*

implements mission strategies across ministries and conveys a high degree of commitment. In its recent reports (2022 and 2023), the Expert Commission on Research and Innovation (EFI) sets out what suitable governance for the New Mission Orientation might look like. Central elements are a Future Committee for Innovation and Transformation at the German Chancellery, which is responsible for strategy and interdepartmental mission teams at the ministries for implementing these strategies.

Based on this governance structure, the state can strategically align its R&I policy in an effective and, above all, orchestrated way. It needs to resist the temptation to call the tune. The music – the solutions to problems – will still largely come from competition and the interaction of economic and societal actors, with occasional nudges from the state.

\* Uwe Cantner, since 2019, has been Chairperson of the Expert Commission on Research and Innovation (EFI) appointed by the German government. He is Professor of Economics/Microeconomics at the Friedrich Schiller University Jena.



# “Unbelievable how flexible this method is”

Leopoldina Member Katalin Karikó will give the evening lecture at the Life Science Symposium of Class II.

**Katalin Karikó has been a member of the Leopoldina since 2022. On 19 April, she will give a public evening lecture in Halle (Saale)/Germany. She recognised at an early stage the potential of synthetically produced mRNA for the treatment of immunological and oncological diseases and of vaccine development.**

*Your expertise is in messenger RNA, or mRNA. What does this molecule do?*

**Katalin Karikó:** Messenger RNA is a molecule which is present in almost every cell of our body. It carries information from the DNA to the cell's protein synthesis factory and tells it what to do. It's a short-lived molecule that usually degrades quickly – you can find dinosaur DNA but not dinosaur mRNA.

*Today we know that if you can manipulate mRNA you can get a cell to make almost any protein. But when you started out you had problems getting people excited about that.*

**Karikó:** In 1990 the Human Genome Project started, so everybody was working with DNA. And when I said for most of the people you don't need to change their genes permanently, sometimes you just need to make some molecule for a therapy, people didn't see that and felt sorry for me.

*You even got demoted by your employer, the University of Pennsylvania?*

**Karikó:** You are never bringing in money, they said. Now they wouldn't say that.

*When did you get in contact with BioNTech, the German biotech company?*

**Karikó:** I met the founder, Uğur Şahin, in the summer of 2013 when I gave a lecture in Mainz/Germany. And he offered me the position of vice president.

*What kind of applications did you work on at BioNTech?*

**Karikó:** We were interested in treating



## **Katalin Karikó ML**

*Adjunct Professor of Neurosurgery at the University of Pennsylvania/USA and former Senior Vice President of BioNTech SE in Mainz/Germany. She has been a member of the Leopoldina since 2022.*

Image: Vilcek Foundation/MHamiltonVisualise

cancer patients. My first project was to develop a method to inject mRNA into tumors in order to attract immune cells that would attack that tumor. Not really a vaccination, but a way to mobilize an immune reaction.

*Did you think that this would be applied in patients any time soon?*

**Karikó:** Every scientist wants to see their work benefitting somebody sooner or later. But I didn't know if I would live long enough to see that.

*That changed when BioNTech got together with Pfizer to develop an mRNA based flu vaccine.*

**Karikó:** Yes, and in January 2020 while we were working on that Uğur Şahin read about a virus that infected people in China. And he thought immediately that some people who were infected but not sick would spread it across the globe.

*How much work was it to adapt your*

*mRNA technology to that new virus?*

**Karikó:** If I had the tools here I could do that in ten minutes. The spike protein of the virus had already been published, so it was easy. It is unbelievable how flexible and how quick this method is.

*The rest is history. How did you get your Covid shot?*

**Karikó:** I had been stuck in Philadelphia since the outbreak of the pandemic, so in December 2020 the University of Pennsylvania organized a public event where my collaborator Drew Weissman and I received our shot in front of the cameras.

*Why did you leave BioNTech last year?*

**Karikó:** I had originally planned to be there for two years, then it turned out to be nine. And now I give many talks and receive awards. In the past I sometimes attended lectures of a famous scientist that was not really up to date about the literature – I don't want to be like that. So reading is one of my main jobs.

*Do you also give talks to young people?*

**Karikó:** When I received the Gairdner Award in Canada last year there were 300 high school students. We have to inspire this next generation, less and less people want to be in science. We have to tell them it's hard work, but it's like detective work – when you find the solution of the puzzle it's so exciting. It's not about being in the spotlight.

*What does it mean for you to be part of Leopoldina?*

**Karikó:** I read about the history of the Academy, all these outstanding scientists, and I thought: oh my god, now I belong to this group of highly esteemed people. That touches you.

■ THE INTERVIEW WAS CONDUCTED BY  
CHRISTOPH DRÖSSER

▶ Life Science Symposium

# “We urgently need medicines”

Understanding Long Covid – International Virtual Panel discusses latest research

After a SARS-CoV-2 infection some people still experience symptoms weeks or months after the acute phase. The latest results of research into “Long Covid” were recently presented to around 600 guests from 30 countries at the International Virtual Panel. Carmen Scheibenbogen, Acting Director of the Institute of Medical Immunology at the Charité Universitätsmedizin Berlin/Germany was one of the experts involved.

*People are coming to you with post-Covid syndrome, still experiencing symptoms more than three months after an infection. What symptoms do they have?*

**Scheibenbogen:** There are a range of different symptoms and clinical pictures. We now have eleven special outpatient clinics in our Post Covid Network at the Charité, and patients are coming to us in the immunology department with suspected myalgic encephalomyelitis/chronic fatigue syndrome, abbreviated to ME/CFS. They are often no longer able to work and are suffering from fatigue and severe intolerance to exertion, cognitive disorders, also referred to as “brain fog”, pain and much more.

*We often read that people with long or post-Covid suffer from fatigue. But is ME/CFS different to fatigue?*

**Scheibenbogen:** Yes, fatigue is a common symptom of Long Covid, but is also a symptom of various other diseases, for example tumour fatigue. ME/CFS on the other hand is a disease of its own, which



**Carmen Scheibenbogen**

Acting Director of the Institute of Medical Immunology, Charité Universitätsmedizin Berlin/Germany

Image: Charité – Universitätsmedizin Berlin

is triggered by different infections – and fatigue is only one symptom. There are many symptoms, but the main problem with ME/CFS is always a severe intolerance to exertion, with a worsening of symptoms often even after the least exertion.

*What do we know about the development of ME/CFS?*

**Scheibenbogen:** It is usually preceded by a severe infection. It more often affects those with an increased genetic risk for autoimmune diseases. This is why more women suffer from ME/CFS, and they more often develop autoimmune diseases.

es. We do not yet fully understand the exact mechanisms. It is probable that antibodies which are stimulated by the infection and then react incorrectly to the body’s own structures play a role, as is the case with other autoimmune diseases.

*So a severe infection is the trigger for other processes?*

**Scheibenbogen:** Exactly, some studies show that the Epstein Barr virus could also be the cause in the case of Covid. This is one of the Herpes viruses, which lie dormant and can be activated from time to time. And the risk of developing Long Covid is connected with the reactivation of the Epstein Barr virus during acute infection. It is possible that the virus is the common denominator for the various infectious diseases which can trigger ME/CFS.

*There is now a National Clinical Study Group on Post Covid and ME/CFS, which has funding of ten million euros. What needs to be researched most urgently?*

**Scheibenbogen:** We urgently need medicines which can treat the causes and cure the diseases. We are now starting treatment studies with medicines already approved for other diseases and combining them with a comprehensive biomarker and special diagnostic programme. In post Covid and ME/CFS muscle strength and the circulation to blood vessels is often reduced, and functional MRT also detects changes in the brain. For this purpose we have set up platforms and are learning so much more about the diseases. I am very happy that we now have this initial support. Unfortunately, the pharmaceutical industry is being very cautious and playing a waiting game, even though we urgently need support. We have so many seriously ill young people who need treatment now.

■ THE INTERVIEW WAS CONDUCTED BY CHRISTINE WERNER

## LEOPOLDINA INTERNATIONAL VIRTUAL PANEL

The Leopoldina International Virtual Panel (LIVP) recently addressed the latest results of research into the causes and symptoms of Long Covid. Akiko Iwasaki (University of Yale, USA) presented the immunological basics of the disease, Marc Lecuit (Institut Pasteur, France) and Carmen Scheibenbogen (Charité, Germany) concentrated on two typical symptoms: the permanent loss of sense of smell and fatigue syndrome. Michael Edelstein (Bar-Ilan University, Israel) looked at Long Covid from the perspective of public health and at the same explained the protective effect of vaccinations in the context of Long Covid. Altogether around 600 interested parties were involved in the discussion. ■ KK



International Virtual Panel “Long Covid”



# Alliance leadership passes to the Leopoldina

The Alliance of Science Organisations in Germany responds to issues concerning the German science system

At the start of the new year Leopoldina took over the rotating leadership of the Alliance of Science Organisations in Germany of the German Research Foundation (DFG). The Alliance of Science Organisations in Germany is an association of the most important science and research organisations in Germany. It regularly contributes to issues of science policy, research funding and structural development of the German science system.

In addition to Leopoldina and the DFG, the Alliance includes the Alexander von Humboldt Foundation, the German Academic Exchange Service

(DAAD), the Fraunhofer Society, the Helmholtz Association, the German Rectors' Conference, the Leibniz Association, the Max Planck Society and the German Science and Humanities Council.

After 2022, a year in which the consequences of the Russian war of aggression on Ukraine and the energy crisis in particular have also affected the science system, important science policy issues are already emerging for 2023. In addition to a reform of the Academic Fixed-Term Contract Act (WissZeitVG), other issues on the agenda include the strategic orientation of government research and innovation policy, and the issue of

the over-regulation of the science systems.

At the same time, the overarching theme of how science can contribute to addressing the challenges of society as a whole and what framework conditions are needed to achieve this remains highly topical. This task relates to the fields of energy systems, climate change, biodiversity, digitalisation and mobility. The Leopoldina will use its leadership this year to foster the necessary dialogue between science and politics. ■ AL

▶ Alliance of Science Organisations in Germany



Image: Thomas Weirische | Leopoldina

## Symposia and Section Meetings

### Leopoldina supports scientific events

Leopoldina supports scientific events initiated and organised by their members. These include symposia relating to topics of science – based policy advice on matters relevant to society. In addition, internal meetings within sections are encouraged to allow exchanges to take place between experts. A further aim is to give stimuli to working groups and other activities of the German National Academy of Sciences.

Applications can be made at any time, although a reasonable lead time should be given before an event. Rooms in the main building of Leopoldina in Halle (Saale)/Germany can also be used free of charged.

■ PG

▶ Guidelines for Leopoldina Symposia

## People | Publications

### Awards and Honours

- **Artemis Alexiadou** ML, Member of the Cultural Studies Section, was admitted to the Berlin-Brandenburg Academy of Sciences and Humanities (BBAW).
- **Annette Beck-Sickinger** ML, Member of the Chemistry Section, was awarded the Richard Willstätter Prize for Chemical Biology 2023 by the joint section Chemical Biology of the DECHEMA Society for Chemical Engineering and Biotechnology (Frankfurt am Main/Germany), the German Pharmaceutical Society (DPHG) (Frankfurt am Main/Germany), the Society for Biochemistry and Molecular Biology (GBM) (Frankfurt am Main/Germany) and the German Chemical Society (GDCh) (Frankfurt am Main/Germany).
- **Antje Boetius** ML, Member of the Geosciences Section, was awarded the “Goldenes Lot” award by the Association of German Surveyors (VDV) (Wuppertal/Germany). She was also honoured by the German Association of University Professors and Lecturers (DHV) (Bonn/Germany) as University Professor of the Year. In addition, the Konrad Adenauer Foundation (KAS) (Berlin/Germany) appointed her Fellow for 2023 and she received the Ernst Ludwig Winnacker Award from the Bayer Foundation (Leverkusen/Germany).
- **Lars Chittka** ML, Member of the Organismic and Evolutionary Biology Section, was elected as Fellow 2022 by the American Association for the Advancement of Science (AAAS) (Washington/USA).
- **Karl Deisseroth** ML, Member of the Neurosciences Section, was awarded the Japan Prize by the Japan Prize Foundation (Tokyo/Japan) in the Life Sciences category.
- **Ivan Đikić** ML, Member of the Biochemistry and Biophysics Section, was awarded the Louis-Jeantet Prize for Medicine by the Louis-Jeantet Foundation (Geneva/Switzerland).
- **Ottmar Edenhofer** ML, Member of the Economics and Empirical Social Sciences Section, was awarded the Bavarian Constitution Medal.
- **Claudia Felser** ML, Member of the Chemistry Section, was admitted to the Academy of Sciences and Literature (Mainz/Germany).
- **Frank Glorius** ML, Member of the Chemistry Section, was awarded the 2022 Otto Bayer Award for Chemistry and Biochemistry by the Bayer Foundation (Leverkusen/Germany).
- **Dirk Görlich** ML, Member of the Biochemistry and Biophysics Section, was awarded the World Laureates Association Prize (Hong Kong/China) in the Life Science or Medicine category.
- **Christian Haass** ML, Member of the Agricultural and Nutritional Sciences Section, was awarded the Hector Science Award by the Hector Foundation II (Weinheim/Germany).
- **Claudia Höbartner** ML, Member of the Biochemistry and Biophysics Section, was awarded the 2023 Gottfried Wilhelm Leibniz Prize by the German Research Foundation (DFG) (Bonn/Germany).
- **Myles Jackson** ML, Member of the History of Science and Medicine Section, was accepted as an Associate Member of acatech – National Academy of Science and Engineering (Munich/Germany).
- **Gero Miesenböck** ML, Member of the Neuroscience Section, was awarded the Japan Prize by the Japan Prize Foundation (Tokyo/Japan) in the Life Sciences category.
- **Frank Neese** ML, Member of the Chemistry Section, was accepted into the Berlin-Brandenburg Academy of Sciences and Humanities (BBAW).
- **Stefan M. Pfister** ML, Member of the Gynaecology and Paediatrics Section, was awarded the 2023 Gottfried Wilhelm Leibniz Prize by the German Research Foundation (DFG) (Bonn/Germany).
- **Walter Rosenthal** ML, Member of the Human Genetics and Molecular Medicine Section, was named University Manager of the Year 2022 by the weekly newspaper “Die Zeit” (Hamburg/Germany) and the CHE Centre for Higher Education (Gütersloh/Germany).
- **Helga Rübsamen-Schaeff** ML, Member of the Microbiology and Immunology Section, was accepted as an



Associate Member of acadtech – National Academy of Science and Engineering (Munich/Germany).

■ **Georg Schett** ML, Member of the Internal Medicine and Dermatology Section, was awarded the 2023 Gottfried Wilhelm Leibniz Prize by the German Research Foundation (DFG) (Bonn/Germany).

■ **Robert Schlögl** ML, Member of the Chemistry Section, was awarded an Honorary Doctorate by the Technical University of Darmstadt (Darmstadt/Germany).

■ **Brenda A. Schulman** ML, Member of the Biochemistry and Biophysics Section, was awarded the Louis Jeantet Prize for Medicine by the Louis Jeantet Foundation (Geneva/Switzerland).

■ **Matthias Schwab** ML, Member of the Physiology and Pharmacology/Toxicology Section, was admitted to the Academia Europaea (London/UK).

■ **Christine Silberhorn** ML, Member of the Physics Section, was appointed a new member of the German Science and Humanities Council (Cologne/Germany).

■ **Catharina Stoppel** Member of the Mathematics Section, was awarded the 2023 Gottfried Wilhelm Leibniz Prize of the German Research Foundation (DFG) (Bonn/Germany).

■ **Jochen Taupitz** ML, Member of the Philosophy of Science Section, was awarded the Medal of Honour of the German Medical Profession by the German Medical Association (Berlin/Germany). He was also appointed Honorary Member of the Association of Medical Ethics Committees (Berlin/Germany). He was also appointed Honorary Member of the Association for the Advancement of German, European and International Medical Law, Health Law and Bioethics in Heidelberg and Mannheim (Mannheim/Germany).

■ **Jackie Y. Ying** ML, Member of the Physics Section, was awarded the King Faisal Prize by the King Faisal Foundation (KFF) (Riyadh/Saudi Arabia).

■ **Anton Zeilinger** ML, Member of the Physics Section, was awarded the “Grand Decoration of Honour in Silver with Star for Services to the Republic of Austria”. He was also awarded an Honorary Doctorate by the University of Innsbruck (Innsbruck/Austria).

## Deceased members

■ **Dieter Kohn** ML | 09 February 1953 to 18 September 2022 | Homburg (Saar)/Germany | Surgery, Orthopaedics and Anaesthesiology Section

■ **Yuri I. Manin** ML | 16 February 1937 to 07 January 2023 | Bonn/Germany | Mathematics Section

■ **Hubert Mörl** ML | 30 December 1935 to 29 July 2022 | Bammental/Germany | Internal Medicine and Dermatology Section

■ **Rudolf Rigler** ML | 13 September 1936 to 05 October 2022 | Stockholm/Sweden | Biochemistry and Biophysics Section

■ **Rudolf Schubert** ML | 26 August 1927 to 03 December 2022 | Halle (Saale)/Germany | Organismic and Evolutionary Biology Section

■ **Erich Thenius** ML | 26 December 1924 to 29 December 2022 | Vienna/Austria | Geosciences Section

■ **Hermann-Josef Wagner** ML | 03 January 1950 to 15 November 2021 | Bochum/Germany | Technical Sciences Section

■ **Eugen Weiß** ML | 24 February 1930 to 08 January 2023 | Giessen/Germany | Veterinary Medicine Section

## New class III members

■ **Knut Brockmann** ML, Göttingen/Germany, University Medical Center Göttingen, Gynaecology and Paediatrics Section

■ **Peter A. Fasching** ML, Erlangen/Germany, Universitätsklinikum Erlangen, Gynaecology and Paediatrics Section

■ **Arndt Hartmann** ML, Erlangen/Germany, Universitätsklinikum Erlangen, Pathology and Forensic Medicine Section

■ **Katerina Harvati-Papatheodorou** ML, Tübingen/Germany, Senckenberg Centre for Human Evolution and Palaeoenvironment and University of Tübingen, Anatomy and Anthropology Section

■ **Angela Hübner** ML, Dresden/Germany, University Hospital Carl Gustav Carus Dresden, Gynaecology and Paediatrics Section

■ **Jörg C. Kalff** ML, Bonn/Germany, University Hospital Bonn, Surgery, Orthopaedics and Anaesthesiology Section

■ **Hans-Ulrich Kauczor** ML, Heidelberg/Germany, Heidelberg University Hospital, Radiology Section

■ **Gerd Kempermann** ML, Dresden/Germany, German Center for Neurodegenerative Diseases (DZNE) and Centre for Regenerative Therapies Dresden (CRTD), TU Dresden, Neurosciences Section

■ **Denise Manahan-Vaughan** ML, Bochum/Germany, Ruhr University Bochum, Neurosciences Section

■ **Michael Roden** ML, Düsseldorf/Germany, Düsseldorf University Hospital, Internal Medicine and Dermatology Section

■ **Ryuichi Shigemoto** ML, Klosterneuburg/Austria, Institute of Science and Technology Austria (ISTA), Neurosciences Section

■ **Marius Ueffing** ML, Tübingen/Germany, Tübingen University Hospital, Ophthalmology, Oto-Rhino-Laryngology and Stomatology Section

■ **Miranda Wolpert** ML, London/UK, Wellcome Trust, Global Health Section

### New class IV members

■ **Marietta Auer** ML, Frankfurt am Main/Germany, Max Planck Institute for Legal History and Legal Theory, Cultural Sciences Section

■ **Robin Alta Charo** ML, Madison/USA, University of Wisconsin-Madison, Philosophy of Science Section

■ **Julia Fischer** ML, Göttingen/Germany, German Primate Center, Leibniz Institute for Primate Research, Psychology and Cognitive Sciences Section

■ **Simone Kühn** ML, Berlin/Germany, Max Planck Institute for Human Development, Psychology and Cognitive Sciences Section

■ **Stephan Lewandowsky** ML, Bristol/UK, University of

Bristol, Psychology and Cognitive Sciences Section

■ **Thomas Metzinger** ML, Mainz/Germany, Johannes Gutenberg University Mainz, Philosophy of Science Section

■ **Daphna Oyserman** ML, Los Angeles/USA, University of Southern California, Psychology and Cognitive Sciences Section

■ **Monika Schnitzer** ML, Munich/Germany, Ludwig-Maximilians-Universität München (LMU Munich), Economics and Empirical Social Sciences Section

■ **Michèle Tertilt** ML, Mannheim/Germany, University of Mannheim, Economics and Empirical Social Sciences Section

### Publication

#### ■ **Acta Historica Leopoldina No. 77**

Harald Kümmerle, Die Institutionalisierung der Mathematik als Wissenschaft im Japan der Meiji- und Taishō-Zeit (1868–1926), Halle (Saale), Stuttgart 2022, ISBN: 978-3-8047-4112-6, ISSN: 0001-5857, doi:10.26164/leopoldina\_10\_00779 (German only)

### Leopoldina Fellowship Programme

#### New fellows

■ **Dr Yuliya Khrunyk** from Lviv (Lemberg)/Ukraine has had a fellowship since January 2023 for one-year of research in the field of physiology, microbiology and biochemistry with Professor Dr Annette Beck-Sickingher ML at the University of Leipzig/Germany, Faculty of Life Sciences, Institute of Biochemistry.

■ **Dr Michael Kilian** from the Clinical Cooperation Unit Neuroimmunology and Brain Tumour Immunology at the German Cancer Research Centre (DKFZ) in Heidelberg will spend 24 months on research with Professor Dr Francisco Quintana at Brigham and Women's Hospital, Harvard Medical School in Boston/USA.

■ **Dr Oleksandra Kunyk** from Kherson/Ukraine has had a fellowship since February 2023 for a one-year project on biotechnology and food chemistry with Professor Dr Walter Leal at the Research and Transfer Centre "Sustainable Development and Climate Change Management" at the Hamburg University of Applied Sciences, Hamburg/Germany.



■ **Dr Sebastian Markert** will be working at the Cell Biology and Biophysics & Electron Microscopy Core Facility at the European Molecular Biology Laboratory (EMBL) in Heidelberg/Germany under Dr Yannick Schwab for six months as part of a return fellowship.

■ **Dr Anika Retzmann** from the Division of Inorganic Trace Analysis at the Federal Institute for Materials Research and Testing in Berlin/Germany will spend 24 months on research at the Department of Physics and Astronomy at the University of Calgary in Calgary/Canada with Professor Dr Michael Wieser.

■ **Dr Susanne A. Schmidt** from the Institute of History at the Faculty of Humanities of Humboldt-Universität, Berlin/Germany will carry out a 15-month project at the Department of History of the School of Humanities and Sciences at Stanford University, Stanford/USA with Professor Dr Londa Schiebinger.

■ **Dr Anton Stepanenko** from Kyiv/Ukraine was awarded a fellowship from November 2022 for a one-year project on molecular biology, genetics and biotechnology with Professor Dr Ingo Schubert ML at the Leibniz Institute of Plant Genetics and Crop Plant Research, Department of Breeding Research / Quantitative Genetics Research Group at the Gatersleben-Seeland site/Germany.

■ **Dr Veith Weinhhammer** from the Visual Perception Laboratory of the Clinic for Psychiatry and Psychotherapy at the Charité – Universitätsmedizin, Berlin/Germany will spend 24 months at the Neurobiology Division of the Department of Molecular and Cell Biology of the University of California, Berkeley in Berkeley/USA with Professor Dr Doris Tsao.

■ **Dr Dymytro Zhulai** from Kyiv/Ukraine has been awarded a fellowship to research nanomaterials and their applications with Professor Dr Svetlana Vitusevich at the Institute of Biological Information Processing (IBI) at the Forschungszentrum Jülich/Germany, for one year starting in March 2023.

## Imprint

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#### Design:

unicom Werbeagentur GmbH, Berlin

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#### Abbreviations:

ML = Member of the Leopoldina