



Leopoldina
Nationale Akademie
der Wissenschaften

Leopoldina news

2/2024

Deutsche Akademie der Naturforscher Leopoldina –
German National Academy of Sciences

Halle (Saale), 3 July 2024

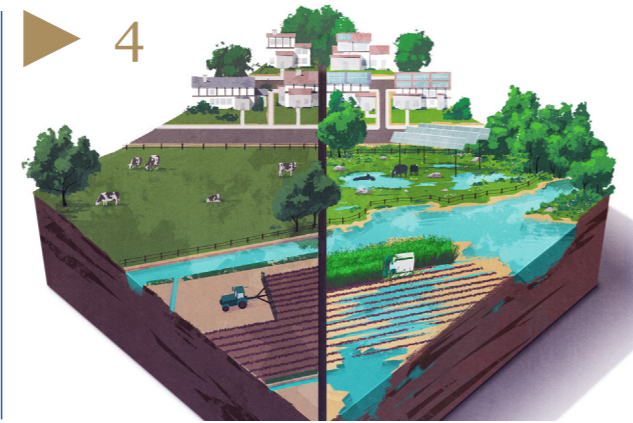


How do we want to
live in the future?

Statement published
“Climate – water supply – biodiversity”

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Statement: On the benefits of near-natural mires and floodplains for the climate, water supply, and biodiversity



Science7: National science academies submit six statements for the G7 Summit in Italy



Science for Future Conference: The Leopoldina and the Chinese Academy of Sciences focus on the path to carbon neutrality

The Leopoldina on Social Media

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Editorial

Dear Members and Friends of Leopoldina,

“How do we want to live in the future?”, asks the new edition of this newsletter. By way of an answer we present you with the Leopoldina Statement “Climate – water supply – biodiversity” published in June, which discusses how mires and floodplains contribute to protecting the climate and biodiversity (see p. 4). Carbon management will also play a decisive role on the path to climate neutrality. In addition to avoiding emissions, CO₂, the most significant greenhouse gas, must be permanently removed from the atmosphere. The Leopoldina published an ad-hoc statement on this subject in which it recommends options for storing and using CO₂ in the long term (p. 7).



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

Image: David Ausserhofer | Leopoldina

When it comes to complying with the Paris climate targets or protecting worldwide biodiversity, international approaches and strategies are crucial to managing global challenges. Since 2015 the Leopoldina has been providing international, science-based policy advice alongside the academies of science from Canada, France, Italy, Japan, the United Kingdom, and the USA in preparation for the annual G7 Summit. Under Italian leadership this year, the S7 academies included forward-looking topics such as sustainable agriculture, AI, and overcoming poverty on their agenda (p. 6). In recent years the Leopoldina has also expanded its cooperation with other international partners such as the Chinese Academy of Sciences (CAS). Often a controversial subject of debate, the questions we also ask ourselves on working with Chinese partners are explored in a new article in the series “Policy advice in the field of conflict between science, politics, and the media” (p. 9).

We hope you enjoy this issue!

“Cleverly linking the powers of technical and natural systems”

Klement Tockner and Franziska Tanneberger talk about the statement on mires and floodplains

Functional mires and floodplains are essential for humans and nature. This is described in the statement “Climate – water supply – biodiversity: For an integrated use of mires and floodplains.” Leopoldina Member Klement Tockner, General Director of the Senckenberg Society for Nature Research, and Franziska Tanneberger, Director of the Greifswald Mire Centre in Greifswald/Germany, were part of the interdisciplinary working group.



Klement Tockner and Franziska Tanneberger.

Images: Sven Tränkner | SGN, Jana Planek

The statement says that healthy, near-natural mires and floodplains make a disproportionate contribution to climate and biodiversity protection. What do they do?

Franziska Tanneberger: In terms of climate protection, mires are a miracle ecosystem. Via the plants' photosynthesis, they bring carbon into the ground and store it there for a long time. These thick peat layers, which we also sometimes find in floodplains, are massive carbon stores. Near-natural mires can also be home to a very specific biodiversity.

Klement Tockner: Floodplains also play a big role with their indirect effects, such as retaining water during high waters or return flows in dry periods. At the same time, floodplains are global centres of biodiversity. Together, mires and floodplains only take up some ten per-

cent of the country's surface area – yet nowhere in central Europe is the variety as high as in these wetlands.

At the moment, rivers and mires are actually fuelling the climate crisis because the systems lack water. What is happening?

Tanneberger: We've pulled the plug on mires, so to speak: 94 percent of the mires in Germany have been drained. Water is, however, the key to the carbon storage process. If there is no water, there is no protective layer around the carbon either. This leads to large amounts of CO₂ now being released from the surface of mires. These emissions make up seven percent of all greenhouse gas emissions in Germany. And in some regions they make up significantly more; in Mecklenburg-Western Pomerania/Germany approximately 40 percent of all emissions.

Tockner: Streams and rivers have been channelled and divided up so that water can be diverted very quickly and to create space for settlements. Along the whole length of the river Rhein, nine million people now live where there used to be floodplains. This limits natural renaturations because technical solutions and the protection of people are often prioritised.

Now mires and floodplains are not simply being flooded, they are also being used. How can more water still get into the areas despite this?

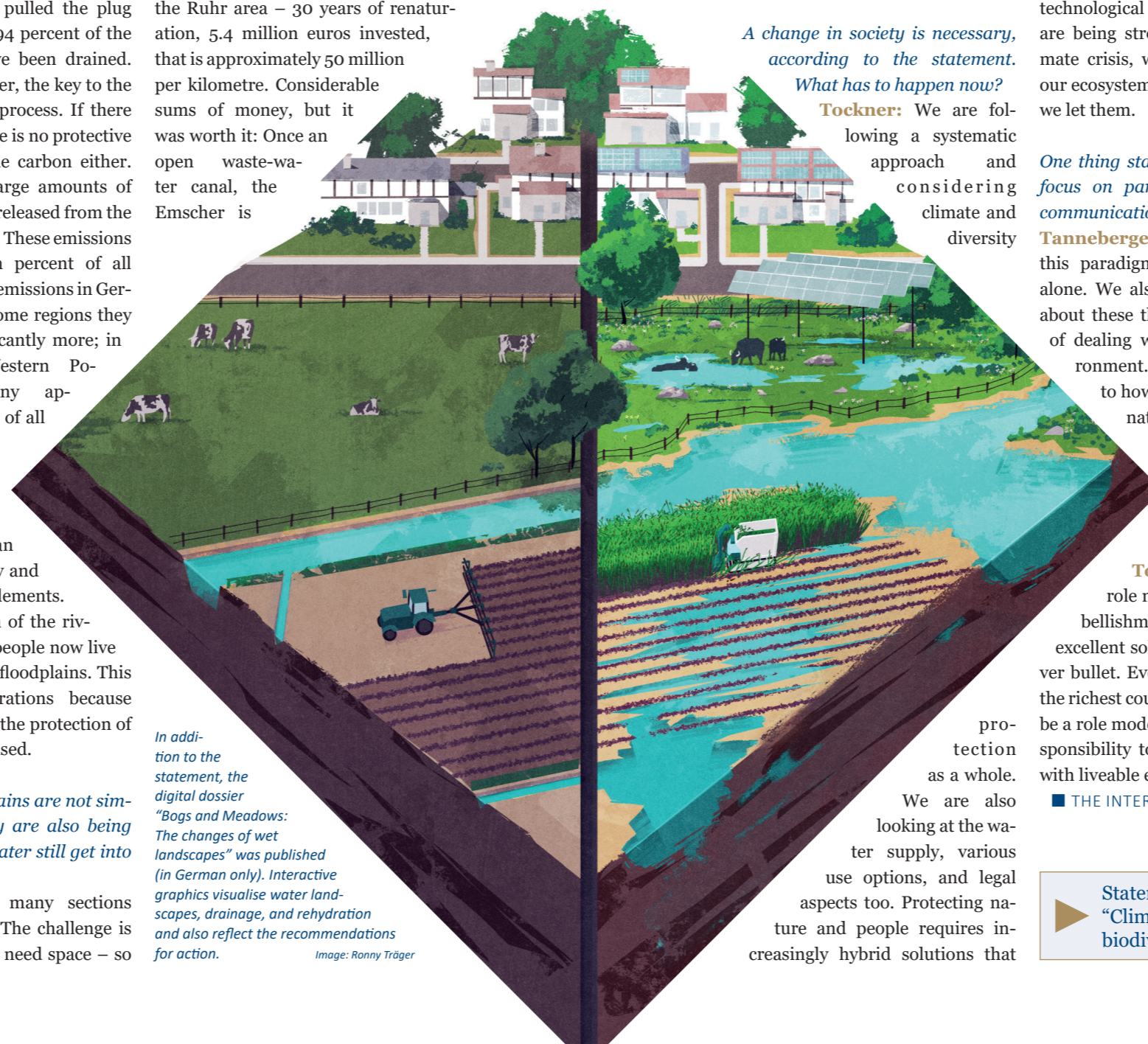
Tockner: There are many sections that can be renatured. The challenge is that streams and rivers need space – so

we're also dealing with a conflict around the use of space. Therefore the various functions and services of mires need to be emphasised. The population must understand why renaturation is so important.

As a successful example, we can take the Emscher, a tributary of the Rhein in the Ruhr area – 30 years of renaturation, 5.4 million euros invested, that is approximately 50 million per kilometre. Considerable sums of money, but it was worth it: Once an open waste-water canal, the Emscher is

In addition to the statement, the digital dossier “Bogs and Meadows: The changes of wet landscapes” was published (in German only). Interactive graphics visualise water landscapes, drainage, and rehydration and also reflect the recommendations for action.

Image: Ronny Träger



A change in society is necessary, according to the statement. What has to happen now?

Tockner: We are following a systematic approach and considering climate and diversity

now a valuable habitat for animals and people. In short, it can be said that protecting nature means protecting people.

Tanneberger: We need alternatives based on synergies. Agricultural and forestry can also take place on re-wetted mires, where we can create renewable energy via photovoltaics and also produce construction materials.

And diet is also a key. In terms of its land usage, meat consumption takes up disproportionately more than a plant-based diet. It is important to have complaints offices for people to turn to if they feel they are in a worse-off position due to the measures.

protection as a whole.

We are also looking at the water supply, various use options, and legal aspects too. Protecting nature and people requires increasingly hybrid solutions that

cleverly link the powers of technical and natural systems. Top priority goes to protecting existing waterways. We cannot set big goals for renaturation and then at the same time not be able to conserve the last natural river sections, such as the Upper Isar.

Tanneberger: Accelerating processes is central to this. Continually postponing is not a good strategy. According to our calculations regarding the mires in Mecklenburg-Western Pomerania, we would need another 180 years for the re-wetting at the current speed. We cannot tolerate such high CO₂ emissions for this long. And before we implement technological solutions, some of which are being strongly pushed, for the climate crisis, we should reflect on what our ecosystems can deliver themselves if we let them.

One thing stands out: There is a lot of focus on participation and forms of communication...

Tanneberger: Yes, we cannot achieve this paradigm shift through numbers alone. We also have to talk differently about these things to find another way of dealing with nature and the environment. It is also closely related to how new generations perceive natural landscapes. That we are once again able to imagine what wetlands could look like and that water belongs to our landscape.

Tockner: We need positive role models that require no embellishment. Science can develop excellent solutions, but there is no silver bullet. Even so, Germany, as one of the richest countries in the world, should be a role model and pioneer. It is our responsibility to leave future generations with liveable environments.

■ THE INTERVIEW WAS CONDUCTED BY CHRISTINE WERNER

▶ Statement (German only) “Climate – water supply – biodiversity”

Crossing Boundaries in Science: The Anthropocene

Leopoldina Members Thomas Lengauer ML and Jürgen Renn ML were part of the planning committee for “The Anthropocene: addressing its challenges for humanity”, the opening conference of the new Max Planck Institute (MPI) for Geoanthropology from 24 to 26 June in Jena/Germany. The conference was organised in cooperation with the Leopoldina as part of the “Crossing Boundaries in Science” series.

It had two main focus points: One, human influence on the Earth system is gradually reaching levels which risk endangering humanity's future on Earth. And two, humanity has been finding it difficult to acknowledge this global threat for some time. Worldwide, researchers in all disciplines are working on this challenge and the concept at its centre is the Anthropocene. “We are researching, for example, the highly complex causes and processes of the Anthropocene and can thus contribute to reducing or even avoiding negative consequences,” explains Jürgen Renn, Director of the MPI for Geoanthropology.

The goal should be to better understand the global challenges and to make decisions on how to conserve liveable environments on our planet. And yet knowledge about the relevant natural processes appears to be more advanced than the suitable categorisation and management of the related challenges. The problem is thus also psychological, social, economic and political, not only scientific. “The conference clearly showed how urgently we need to look at these questions and that solutions can only be found by closely cooperating with numerous scientific disciplines,” says Leopoldina Presidium Member Thomas Lengauer.

▶ Crossing Boundaries in Science 2024

Academies submit six statements for the G7 Summit in Italy

S7 meeting also concentrates on the previous experiences of G7 policy advice



On the occasion of the Science7 meeting, the scientific academies of the G7 nations submitted their joint statements to the Italian President Sergio Mattarella (centre).
Image: Paolo Giandotti

On 11 and 12 April the G7 academies presented their joint statements to the public and submitted them to the Italian President Sergio Mattarella in Rome/Italy as part of the Science7 Academy Meeting. The statements were written under the leadership of the Italian Accademia Nazionale dei Lincei and with the participation of Leopoldina members.

Recommendations for action regarding the following six critical global challenges were provided in the statements:

Sustainable agriculture must increase global food production without further contributing to climate and environmental change. This also requires sustainable diet and consumption patterns.

The G7 academies recommend clear framework conditions for the development and use of artificial intelligence (AI). Traceability of the data on which AI models are based is crucial.

The cultural legacy of humanity must be better protected from destruction and

ideological misuse. Teaching and communication, such as in museums and schools, but also via digital platforms, play an equally large role as the interdisciplinary cooperation between the natural and social sciences and the humanities.

The resilience of the health system must be increased and pandemic preparedness improved. For this, the academies recommend intensifying international cooperation and stepping up the use of innovative technologies and data potential. Increasing antibiotic resistance must be addressed as a matter of urgency.

In the context of international tension and based on scientific publications, the academies commented on the grave consequences that using nuclear weapons brings for people and the planet. They called for the G7 to reinforce its commitment to nuclear arms control and its stance against the use of atomic weapons.

Effective poverty reduction requires switching to a strategy that approaches poverty as a multi-dimensional issue.

Creating a reliable infrastructure is just as crucial as creating access to education. In this regard, focus should be on the countries in Sub-Saharan Africa, as these are particularly affected by both inequality and climate change.

In addition to the presentation and submission of the recommendations, the Science7 meeting in Rome served as a space for scientific discussion of the topics covered in the statements. Leopoldina President Gerald Haug ML led the session on agriculture and took part in a panel discussion of the academy presidents regarding previous experiences with G7 policy advice.

Advising the G7 and G20 Summits is one of the main strategic tasks of the Leopoldina in the scope of international relations. The G7 Summit took place from 13 to 15 June in Apulia/Italy. In the coming year, Canada will take on the G7 presidency and the Royal Society of Canada will lead the Science7 process.

■ CHW

► S7 Statements

Actively and permanently removing greenhouse gas CO₂ from the atmosphere

Ad-hoc statement “Key elements of carbon management” published

In order to achieve carbon neutrality in Germany and Europe by 2045 to 2050, reducing emissions is no longer sufficient. The most significant greenhouse gas CO₂ must be actively and permanently removed from the atmosphere. This means a third scope of action becomes important on the path to carbon neutrality: carbon management.

The ad-hoc statement “Key elements of carbon management” presents the Leopoldina’s recommendations regarding the various possibilities of CO₂ storage and long-term usage. This includes measures for technical implementation, economic incentives, and international cooperation.

Scientists call for research and development on CO₂ removal in industrial processes and to encourage direct removal from the atmosphere (Direct Air Capture, DAC). DAC should primarily be established where climate conditions or energy costs from regenerative sources are cheap.

The emphasis here is on the fact that CO₂ storage underground (Carbon Capture and Storage, CCS) should be used for non-avoidable CO₂ emissions, from agriculture and industry for example. Using CCS processes is also recommended both in the marine environment and on land. The potential of natural CO₂ storage, especially via reforestation and re-wetting mires, should be scientifically promoted. In addition to storage, the establishment of a closed cycle economy for coal is necessary in order to use CO₂ as a material and to be able to manufacture durable and long-life goods (Carbon Capture and Utilization, CCU).

The ad-hoc statement suggests establishing economic framework requirements for removing CO₂ from the



Image: martin33 | AdobeStock

atmosphere, promoting the development of relevant markets, and activating private capital for this purpose. The transport infrastructure for CO₂ and CCU products must be expanded across Europe, supported by investment incentives, and combined with comparable planning for hydrogen and other mat-

erial energy sources. Available infrastructure, such as the gas grid, should be used as comprehensively as possible and thus not too quickly given up.

Removing CO₂ from the atmosphere requires that conditions be established for business models to build on and stable markets to develop. To this end, for example, specific certificate markets could be developed. Regulations to coordinate the removal and economic assessment of CO₂ across Europe would be important. Experts also recommend international cooperation in research, development and pilot projects. Countries in the Global South in particular are especially well placed to use renewable energy due to their location and cost-effective conditions.

The ad-hoc statement was prepared by the Leopoldina Focus Group “Climate and Energy”. ■ EDS

“AN INTEGRATED APPROACH TO CARBON MANAGEMENT”

With its two strategies, the Carbon Management Strategy (CMS) and the long-term strategy negative emissions (LNe), the Federal Government wants to create a strategic framework for carbon management in Germany and has set out the first key points for this. The present momentum of the academies’ project “Energy Systems of the Future” (ESYS) categorises, based on these key points, the roles and limits of carbon management in climate protection.

► ESYS momentum (German only)

► Ad-hoc statement (German only) “Key elements of carbon management”

“On the Path to Carbon Neutrality”

Second Science for Future Conference with the Chinese Academy of Sciences in October

In 2018, the Leopoldina and the Chinese Academy of Sciences launched the Science for Future initiative. The goal is to highlight the importance of basic research for society. “On the Path to Carbon Neutrality” is the second conference in the series. On the Leopoldina’s side, it was prepared by Katharina Kohse-Höinghaus ML and Harald Fuchs ML.



Katharina Kohse-Höinghaus and Harald Fuchs.

Images: Norma Langohr | Bielefeld University, Studio Wiegell Münster

Why are you planning a conference on carbon neutrality with China? Are not the challenges of the two countries too different?

Katharina Kohse-Höinghaus: Both of us have been in China a long time and it is simply evident that achieving carbon neutrality is not possible without China. China is one of the biggest contributors to climate gas emissions. In terms of emissions per capita per year, however, we are somewhat the same – with eight tonnes of CO₂ per capita per year. Of course, China has a much larger population, so more has to happen there than in Germany, but this is already the case – with fast approval procedures and state support.

Harald Fuchs: Another comparison: Both countries use little oil and gas, and have to date relied on carbon and nuclear power. And the fact that complementary approaches can be used also speaks for the cooperation. Every country has different mechanisms. In China, the translation of research into application is in particular structured differently. And there we have, I believe, a good mix of different approaches in technology transfer which we can discuss.

So how can each side help each other advance regarding CO₂ neutrality?

Kohse-Höinghaus: There are different sectors, not only the energy sector, but also, for example, the construction industry. Concrete is very CO₂ intensive. There is a high construction rate in China and when it comes to insulation in Germany,

not everything has been implemented yet. Then we have steel production and the chemical industry, where both countries are striving for green processes. These are important areas on the path to carbon neutrality.

Fuchs: In both countries there is battery development. China is 10 times further ahead than we are. China is much stronger than us in this regard. Of course, there are also secondary effects of the presence of CO₂, for example the release of methane from permafrost and stone, and bound CO₂ in seaweed. These processes take a long time. The broad application of new technologies and cooperation is very important so that we can work more efficiently and in several directions at once in various critical areas.

Kohse-Höinghaus: When it comes to

CO₂ neutrality, there are so many areas needing improvement which are very important to interdisciplinary exchange. Sector coupling and the feedback effect alone means that scientific disciplines must work together.

China wants to be carbon neutral by 2060 but is still building coal power stations. How will that work?

Kohse-Höinghaus: We have to accept that coal is currently an important energy source in China. But large photovoltaic and wind power stations are also being built. In 2022, China was home to roughly 35 percent of all the photovoltaic capacity installed worldwide. The peak for coal is expected before 2030 – we’ll have to wait and see if that works out.

Fuchs: Coal is also a bridging technology in China. China has the advantage of being a very big country. Massive, sprawling solar plants are mostly located in the west and north of China, for example in the Shanxi and Hebei provinces. Plants of this size could provide large parts of Europe with electricity. It remains to be seen which plants and technologies for binding or storing CO₂ will be developed in China by 2030 to reduce the emissions of new coal power plants.

What should the conference in October provide for both countries?

Kohse-Höinghaus: It should facilitate scientific interaction, sustain discussion channels, especially for young researchers. It’s not only an opportunity to talk about a breakthrough in area X, it’s also an opportunity to discuss joint approaches for the world issue of CO₂ neutrality.

Fuchs: We are working together in the hope that we can progress more quickly together, including on decarbonisation.

■ THE INTERVIEW WAS CONDUCTED BY CHRISTINE WERNER

SCIENCE FOR FUTURE

The second Science for Future Conference presents innovative approaches from basic research and application for discussion, and opens up a dialogue on the strategies in Germany and China for achieving carbon neutrality in both countries. In addition, the conference offers an interdisciplinary platform for exchanging knowledge and experiences with internationally renowned scientists.

► Conference “On the Path to Carbon Neutrality”

Global challenges require international approaches and strategies

Series “Policy advice in the field of tension between science, politics and the media” (Part 7)

As a National Academy the Leopoldina has the task of promoting scientific cooperation as well as providing science-based policy advice. The academy implements each task both nationally and internationally – and alongside Chinese partners, in particular with the Chinese Academy of Sciences (CAS). Joint activities include scientific symposia or providing policy advice at the summit meetings of the G20 state and government heads. In 2018, the CAS and the Leopoldina launched the joint conference series Science for Future. The second conference “On the Path to Carbon Neutrality” will take place in October in Berlin/Germany.

BY RUTH NARMANN AND SASKIA STEIGER*

Today, China is an important actor in the international research and innovation landscape. In key areas such as artificial intelligence and biotechnology, as well as large research infrastructures, China is now among the world leaders. China is thus a relevant partner for German researchers, yet the cooperation is currently subject to controversial discussion in science, politics and the media.

But there are good reasons for working with China.

Managing global challenges such as climate change or pandemics requires

international approaches and strategies. Cooperation with China is also important when it comes to maintaining Germany’s competitiveness as an innovation and research location. This involves access to knowledge and infrastructure. Chinese scientists also currently play an important role in the German academic system. Furthermore, research cooperation fosters both knowledge and a sociopolitical effect with its “science

er, expertise on China – and not only at universities but also government authorities and in administration and politics. This involves not only intercultural schooling, but also specific information on the Chinese research landscape and its key stakeholders, for example.

Not least, it is important to speak to China, not just about them, as shaping cooperation requires a proactive approach in view of differing framework

“Shaping cooperation requires a proactive approach in view of differing framework requirements and moral values. This means working on a sustainable consensus, again and again, even when it is difficult.”

diplomacy”: By means of dialogue and meetings, cooperation transfers knowledge about people, society and living conditions in China and Germany.

Working with China therefore is and remains worthwhile, but relevant questions need to be considered. What value does cooperation bring, what goals are involved, and what basic requirements are necessary? These questions should be clarified in advance. Strategic, interest-led cooperation means regularly checking these aspects, addressing problems, and ending cooperation if necessary.

While a responsible way of handling risks is important, this will not be achieved by even more laws and regulations. These simply lead to more bureaucracy that increasingly paralyses scientific work and thus goes against a country’s innovative power. A prerequisite for informed management is, howev-

requirements and moral values. This means working on a sustainable consensus, again and again, even when it is difficult. The Leopoldina significantly supports this via its involvement in the national dialogue on China as well as in the direct cooperation with its Chinese partners.

* Ruth Narmann has headed the International Relations Department at the Leopoldina since June 2023. Beforehand, she was a sinologist who had been active at the Leopoldina since 2011 and was vice-head of the department from 2013. Saskia Steiger is a sinologist and sociologist and has been the senior officer for relationships to China and India at the International Relations department since 2024.

► International Cooperation with China

“Obesity is a brain disorder”

Leopoldina Member Matthias Tschöp holds the lecture for the meeting of Class III – Medicine

Physician Matthias H. Tschöp, Member of the Leopoldina since 2013 and bearer of the Carus Medal, is the CEO of Helmholtz Munich. Specialising in neuroendocrinology, his insights regarding the signal paths between the brain and the digestive tract were a crucial contribution in the development of the new “weight loss injection”. In the interview he looks ahead to his public lecture at the certificate presentation of Class III – Medicine.



Matthias H. Tschöp ML
Chief Scientific Officer, Helmholtz Munich/Germany, and one of the leading international scientists for diabetes and obesity. He has been a member of the Leopoldina since 2013.

Image: Matthias Tunger | Helmholtz Munich

What makes losing weight so difficult for extremely overweight people?

Matthias H. Tschöp: Our genetics are not made for us to be able to maintain our weight in times of broad calorific abundance and predominantly sedentary activities. In order to store calories our body has many signals that prevent weight loss attempts.

How can molecules similar to natural digestive hormones and used in a different dosage for type-2 diabetes help with this?

Tschöp: Two insights were important: Obesity is a brain disorder – and it’s there that we have to change a combination of signals. The superhormones that ultimately led to the breakthrough are longer and more effective than natural peptides. They activate various receptors in the brain and thus encourage weight loss in several ways. Predominantly they regulate appetite and satiety in the brain and also improve insulin sensitivity.

In this way, they not only appear to slow down the irresistible cravings for chocolate bars, but also the desire for alcohol, and it is also possible they are effective against gambling addiction. We have to stay on this, in order to understand all contexts.

Your research was particularly focused on molecules containing multiple hormones. Why can these do more than one hormone alone?

Tschöp: In combination they have an

enormous synergistic potential, they act together in the brain. On top of this, they have fewer side effects.

Doesn’t willpower work too then, if losing weight is “in the mind”?

Tschöp: Some lucky people’s genes gift them a metabolism which makes this eas-

CERTIFICATE PRESENTATION AND LEOPOLDINA LECTURE

In July, Class III – Medicine will meet in Halle (Saale)/Germany for the certificate presentation to the new members. Physician Matthias H. Tschöp ML will hold the public lecture “The new weight loss injection”. This will be linked to the Mendel Medal award ceremony to Thomas Boehm ML, Honorary Professor at the Medical Faculty of the University of Freiburg/Germany. He is honoured for his research in the field of immunobiology and genetics.

▶ Leopoldina Lecture

ier. Appealing to an extremely overweight person’s willpower is very inappropriate, akin to telling people with depression to “pull themselves together”. Gene therapy, however, is promising for real healing. Until then we have to be thankful that we have these new medications, as they also prevent secondary diseases such as diabetes.

In the meantime there is also a demand among non-overweight or slightly overweight people who can afford the medication. Celebrities are talking about it. Does this worry you?

Tschöp: So long as the availability of the medication is limited, it should be provided to those who need it the most. Doctors play an essential role here: They are responsible for ordering the prescription-only medicines. As a matter of fact, the triple-agonists, coming soon, appear to function the best in massively overweight people.

Until then, the drugs must be injected weekly. When will there be a “weight loss pill”?

Tschöp: There are various new developments, 20 to 30 compounds are in the pipeline. However, they must be given in high doses to ensure that the peptides do not dissolve in the gastro-intestinal tract. “Small molecules” which directly dock at the receptors are currently even less effective.

More crucial than the question “injection or pill” is, in my opinion, another: Do you really want to take an extremely effective yet expensive medication for the rest of your life? We need lighter, milder medications for weight maintenance programmes. A second challenge for research is the specific protection of muscles. Using the new medications to lose weight will also always mean a loss of muscle mass to some extent.

■ THE INTERVIEW WAS CONDUCTED BY
ADELHEID MÜLLER-LISSNER

NEW MEMBERS CLASS II - LIFE SCIENCES



The new members of Class II – Life Sciences that were accepted to the Leopoldina in 2023 (from left to right) together with Leopoldina President Gerald Haug (ML) (centre/wearing chain of office): Eric Warrant ML, Tobias Erb ML, Petra Dersch ML, Helmut Grubmüller ML, Tanja Stadler ML, Nico Eisenhauer ML, Annette Oxenius ML, Christian Wolfrum ML, Christa Müller ML, Mikael Simons ML, Christoph Plass ML, Maria-Elena Torres-Padilla ML, Andrea Musacchio ML, Karl-Josef Dietz ML and Martin Beck ML.

Image: Markus Scholz | Leopoldina

“Without carbon, nothing is possible”

Leopoldina Member and 2024 Leibniz Prize winner Tobias Erb on defossilisation instead of decarbonisation

Can carbon dioxide be used as a future raw material source? Leopoldina Member Tobias Erb ML addressed this question in the public lecture of Class II. The chemist and biologist pursues the idea of obtaining carbon directly from CO₂. In the interview he outlines his thoughts on how we should be talking about a defossilisation of economy and society rather than a decarbonisation.



Tobias Erb.

Image: Chris Kettner

Why is the greenhouse gas, in your opinion, a resource of the future?

Tobias Erb: Human life, whether its diet or the materials in the surrounding environment, is based on carbon. Without carbon, nothing is possible. We will, as a result, not be able to decarbonise as a society, but we will have to defossilise. That is an important distinction. The big vision is to directly obtain carbon from CO₂ and not from crude oil, in order to thus build up a CO₂-based sustainable economy. Synthetic biology can significantly contribute to this.

What can it offer?

Erb: Nature can already capture large

amounts of CO₂ via photosynthesis. It does this however – from a human perspective – very inefficiently and via a complicated product, i.e. biomass. The approach of our working group was to radically rethink this process of CO₂ conversion and design it more efficiently.

amounts of CO₂ via photosynthesis. It does this however – from a human perspective – very inefficiently and via a complicated product, i.e. biomass. The approach of our working group was to radically rethink this process of CO₂ conversion and design it more efficiently.

An example of this is artificial photosynthesis. How does it work?

Erb: To start with, there was the fundamental question of whether a primordial process such as photosynthesis can even be reinvented. First, we drafted various theoretical alternatives, which we

then implemented in test tubes, and are now introducing to cells. You could say that we have developed a new operating system for photosynthesis. The exciting question is whether, after billions of years of evolution, natural cells can even run such new programmes.

You’re blindsiding evolution...
Erb: People always assume evolution is very creative, when in fact it is very limited because in most cases it remains the same as what it had originally invented and only tries to optimise that. Evolution rarely succeeds at innovating. In synthetic biology I can completely redesign a process like photosynthesis. This facet, developing something new which nature did not invent and to then test this in a living organism such as a cell, is the principle of our research.

■ THE INTERVIEW WAS CONDUCTED BY
BENJAMIN HAERDLE

▶ Complete interview

On researching Kolbe electrolysis and the marshmallow experiment on the US Coast

Historian Susanne Schmidt and chemist Nils Kurig supported by the Leopoldina Scholarship



A research stay also includes discovering the world around universities and institutes, and getting to know the landscape and cultures. This was the case for Susanne Schmidt (left), now back in Berlin/Germany, whose months in California were like a “summer research retreat”. Nils Kurig uses his time outside of the lab for daytrips.

Images: private



With its Postdoc Scholarship the Leopoldina supports young researchers who can then spend up to two years abroad. This is how a science historian and chemist found themselves on the US Pacific Coast.

The marshmallow experiment is one of the most famous psychological tests. In the late 1960s, Stanford researcher Walter Mischel gave a preschool child a sweet, with the promise of another if the child could wait 15 minutes before eating it – a measurement of the ability to delay gratification. What few people know: Mischel had already carried out similar experiments back in the 1950s in Trinidad to research the differences between white and Black children. “There are no historic studies on this,” says science historian Susanne Schmidt from the Humboldt Universität zu Berlin/Germany.

Schmidt received a scholarship from the Leopoldina for a 15-month stay in Stanford, near San Francisco, in order to study Mischel’s original documents. She delved into the archives at the institute of the renowned science historian Londa

Schiebinger, and lived in an interdisciplinary post-doc flatshare. The time in California was like a “summer research retreat”, according to Schmidt, who is now working on a book about the marshmallow experiment in Berlin. For now she would like to stay at the Humboldt Universität and continue working on the political and social relationships in human science research.

Nils Kurig has been at the Scripps Research Institute in Southern California since February. At his home university

GAIN CONFERENCE

The German Academic International Network (GAIN) organises a conference every year at which internationally active scientists from Germany engage with stakeholders from the German academic landscape, politics and industry. From 23 to 25 August the Leopoldina, whose funding programme primarily supports postdocs, will also be represented at the conference in San Francisco/USA. The two postdoctoral fellows Nils Kurig und Johannes Grosskopf will be present.

▶ Fellowship Programme

in Aachen/Germany, the chemist had focused on chemical processes for energy storage – an important element of climate-neutral energy economy. It was pure coincidence that he discovered a research group in San Diego was using one of the processes he was working with for a completely different purpose: optimising the synthetication of medication ingredients with the help of “Kolbe electrolysis”. This process is, however, only one of many methods.

Kurig was excited to think outside of the box and to switch from inorganic to organic chemistry for two years. In Aachen he had headed an entire group, but in San Diego he had to return to the lab and work with test tubes and solutions. “That was indeed quite an adjustment.”

He took his wife to the USA with him, as maintaining contact with colleagues is not easy – also because of the enormous work pressure. “They are all under extreme stress, many work all through the weekend.” After his time in the USA, he will likely return to researching renewable energy and look for a position as a junior professor or junior group leader.

■ CDR

SCIENCE-BASED POLICY ADVICE: A RECIPROCAL LEARNING PROCESS

To celebrate his 90th birthday, the Leopoldina honoured their former president Volker ter Meulen ML on 19 June in Halle (Saale)/Germany with the symposium “Science-based policy advice: a reciprocal learning process”. Numerous current and former colleagues and researchers highlighted central aspects of his impact and discussed the development potential of science-based policy advice. Guests included retired Federal Minister Annette Schavan, the president of EASAC Wim van Saarlöss, Leopoldina President Gerald Haug ML (in picture) and the Leopoldina Members Ernst-Ludwig Winnacker ML and Christian Drosten ML. During ter Meulen’s tenure from 2003 to 2010 as the 25th President of the Leopoldina, the academy’s work was intensified in international committees and its transformation into a working academy producing independent, science-based consultation for politics and society was reinforced. These activities significantly contributed to the Leopoldina being named Germany’s National Academy of Sciences at the Joint Science Conference in 2008.

■ ART / Image: Markus Scholz | Leopoldina



Developing “academic bridges” to Ukraine

Organised by the Leopoldina, the Alexander von Humboldt Society, the Volkswagen Foundation and others, hundreds of scientists from Ukraine met mid-April in Berlin/Germany and opened the preliminary programme for the Ukraine Recovery Conference on 11 and 12 June. The German funding organisations and Ukrainian representatives talked in depth about their experiences, challenges and hopes as well as the paths of science diplomacy for Ukraine.

The Russian war of aggression against Ukraine hit the country’s education, research and innovation systems hard: Thousands of researchers and university professors have fled Ukraine. In 2022 they assumed it would be a temporary situation and sought out scholarships or visiting professorships abroad while maintaining their personal and institutional connections to Ukraine.

Many scientific organisations and foundations as well as the European Commission set up their own funding

programmes for the Ukrainian scientists seeking refuge.

Now, after more than two years of war, the mood is one of uncertainty but also resilience, innovation and vigour. At the pre-conference in April it was clear that the funding offers had been accepted. The funding experiences were overwhelmingly positive for both sides. The integration of Ukrainian researchers in Western and global scientific networks has been a tremendous success.

That said, existing funding systems do need an adjustment. They should be prepared for a longer time period and move away from a humanitarian approach towards supporting an “academic bridge” between Ukraine, Germany, and Europe. Reconstructing education, research and innovation as key sectors for the country’s future is particularly crucial for the academic diaspora. The Leopoldina will continue to support such efforts to the best of its abilities and as part of its partnership with the National Academy of Sciences of Ukraine.

ALLEA

Academy network celebrates 30 years

The European Federation of Academies of Sciences and Humanities (ALLEA) celebrated its 30 years of existence on 22 and 23 May at its general assembly in Berlin/Germany. An open symposium that was opened by Leopoldina Vice President and plant geneticist Ulla Bonas ML, was dedicated to the challenges of European research cooperation against the backdrop of a changing geopolitical environment. A high-ranking panel, including CERN General Director Fabiola Gianotti and Katja Becker ML, President of the German Research Foundation (DFG), discussed the tensions between international cooperation, research safety, and freedom of science.

The General Assembly was hosted by the three German members of the network: The Union of the German Academies of Sciences and Humanities, Die Junge Akademie, and the Leopoldina. Physician and Leopoldina Member Annette Grüters-Kieslich ML was selected for another legislative period on the ALLEA board.

■ LB

■ CHW

People

Awards and Honours

■ **Artemis Alexiadou** ML, Member of the Cultural Sciences Section, has been awarded the Berliner Wissenschaftspreis by the Governing Mayor (Berlin/Germany).

■ **Elisabeth André** ML, Member of the Informatics Section, has been accepted as a member of acatech – National Academy of Science and Engineering (Munich/Germany).

■ **Andreas J. Bäuml** ML, Member of the Microbiology and Immunology Section, has been admitted to the National Academy of Sciences (NAS) (Washington D.C./USA).

■ **Matthias Beller** ML, Member of the Chemistry Section, has been awarded the Wilhelm Ostwald Medal of the Saxon Academy of Sciences and Humanities (Leipzig/Germany).

■ **Konrad Bergmeister** ML, Member of the Engineering Sciences Section, has been accepted as a member of acatech – National Academy of Science and Engineering (Munich/Germany).

■ **Donna G. Blackmond** ML, Member of the Chemistry Section, has been admitted as a Member of the Royal Society (London/UK).

■ **Thomas Boehm** ML, Member of the Human Genetics and Molecular Medicine Section, was awarded the Mendel Medal of the German National Academy of Sciences Leopoldina (Halle (Saale)/Germany).

■ **Leena K. Bruckner-Tuderman** ML, Member of the Internal Medicine and Dermatology Section, was awarded Honorary Senatorship at the University of Freiburg/Germany.

■ **Emmanuelle Charpentier** ML, Member of the Human Genetics and Molecular Medicine Section, has been admitted as a Foreign Member of the Royal Society (London/UK).

■ **Ignacio Cirac** ML, Member of the Physics Section, has been admitted to the National Academy of Sciences (NAS) (Washington D.C./USA).

■ **Patrick Cramer** ML, Member of the Biochemistry

and Biophysics Section, has been admitted as a Foreign Member of the Royal Society (London/UK).

■ **Ingrid Daubechies** ML, Member of the Mathematics Section, has been admitted as a Foreign Member of the Royal Society (London/UK).

■ **Veit Flockerzi** ML, Member of the Physiology and Pharmacology/Toxicology Section, has been admitted as a Corresponding Member of the Bavarian Academy of Sciences and Humanities (Munich/Germany).

■ **Michael Frese** ML, Member of the Psychology and Cognitive Sciences Section, has been awarded the Global Award for Entrepreneurship Research of the Swedish Entrepreneurship Forum (Stockholm/Sweden).

■ **Wolf B. Frommer** ML, Member of the Genetics/Molecular Biology and Cell Biology Section, has been admitted to the National Academy of Sciences (NAS) (Washington D.C./USA).

■ **Gerd Hasenfuß** ML, Member of the Internal Medicine and Dermatology Section, has been awarded the Leopold Lichtwitz Medal by German Society of Internal Medicine (DGIM) (Wiesbaden/Germany).

■ **Thomas A. Henzinger** ML, Member of the Informatics Section, has been admitted as a Foreign Member of the Royal Society (London/UK).

■ **Matthias Kleiner** ML, Member of the Engineering Sciences Section, has been awarded the Order of the Rising Sun, Gold and Silver Star of Japan.

■ **Andrej Kral** ML, Member of the Ophthalmology, Oto-Rhino-Laryngology and Stomatology Section, has been awarded the ARO Pioneer Award in Basic Science by the Association for Research in Otolaryngology (ARO) (Brentwood/USA).

■ **Dieter Langewiesche** ML, Member of the Cultural Sciences Section, has been awarded the 2024 Lion Feuchtwanger Prize by the Akademie der Künste (Berlin/Germany).

■ **Johannes Lehmann** ML, Member of the Agricultural and Nutritional Sciences Section, has been admitted to the National Academy of Sciences (NAS) (Washington

D.C./USA).

■ **Ulrike von Luxburg** ML, Member of the Informatics Section, has been awarded the 2024 Communicator Award of the German Research Foundation (DFG) (Bonn/Germany) and the Stifterverband (Essen/Germany). She also received the Tübingen Prize for Science Communication from the University of Tübingen/Germany.

■ **Friedhelm Meyer auf der Heide** ML, Member of the Informatics Section, has been named EATCS Fellow 2024 by the European Association for Theoretical Computer Sciences (EATCS).

■ **Hermann Parzinger** ML, Member of the Cultural Sciences Section, has been accepted as a foreign member of the Georgian National Academy of Sciences (Tbilisi/Georgia).

■ **Heike Riel** ML, Member of the Engineering Sciences Section, has been accepted as a member of acatech – National Academy of Science and Engineering (Munich/Germany).

■ **Johan Rockström** ML, Member of the Earth Sciences Section, has been awarded the Tyler Prize for Environmental Achievement by the University of Southern California (Los Angeles/USA).

■ **Herbert Roesky** ML, Member of the Chemistry Section, was awarded the Leonardo da Vinci Award of the European Academy of Sciences (Brussels/Belgium).

■ **Joachim Sauer** ML, Member of the Chemistry Section, was awarded the Blaise Pascal Medal in Chemistry of the European Academy of Sciences (Brussels/Belgium).

■ **Christoph M. Schmidt** ML, Member of the Economics and Empirical Social Studies Section, has been awarded the Social Market Economy Prize by the Wirtschaftspolitischer Club Deutschland (WPCD) (Berlin/Germany).

■ **Chris-Carolin Schön** ML, Member of the Agricultural and Nutritional Sciences Section, has been awarded an honorary doctorate by the Heinrich Heine University Düsseldorf (Düsseldorf/Germany).

■ **Paul Schulze-Lefert** ML, Member of the Organismic and Evolutionary Biology Section, has been admitted as a Foreign Member of the Royal Society (London/UK).

■ **Erin Schuman** ML, Member of the Biochemistry and

Biophysics Section, has been admitted as a Foreign Member of the Royal Society (London/UK).

■ **Helmut Schwarz** ML, Member of the Chemistry Section, was named an Honorary Member of the Berlin-Brandenburg Academy of Sciences and Humanities (Germany).

■ **Ali Mehmet Celâl Şengör** ML, Member of the Earth Sciences Section, has been accepted as a Corresponding Member of the Bavarian Academy of Sciences and Humanities (Munich/Germany).

■ **Christine Silberhorn** ML, Member of the Physics Section, has been accepted as a member of acatech – National Academy of Science and Engineering (Munich/Germany).

■ **Julia Anne Vorholt-Zambelli** ML, Member of the Microbiology and Immunology Section, has been admitted to the National Academy of Sciences (NAS) (Washington D.C./USA).

■ **Don Zagier** ML, Member of the Mathematics Section, has been awarded the Gumin Prize for Mathematics by the Carl Friedrich von Siemens Foundation (Munich/Germany).

■ **Anton Zeilinger** ML, Member of the Physics Section, was named as Honorary Citizen of the city of Vienna/Austria.

■ **Peter Zoller** ML, Member of the Physics Section, has been accepted as a Corresponding Member of the Bavarian Academy of Sciences and Humanities (Munich/Germany).

■ **Bernhard Zwißler** ML, Member of the Surgery, Orthopaedics, Anaesthesiology Section, has been named Honorary Citizen of the Goethe University Frankfurt (Frankfurt am Main/Germany).

Deceased members

■ **Karlheinz Bauch** ML | 19 February 1936 to 28 November 2023 | Chemnitz/Germany | Internal Medicine and Dermatology Section

■ **Gottfried Benad** ML | 15 March 1932 to 24 February 2024 | Beselin/Germany | Surgery, Orthopaedics, Anaesthesiology Section

■ **Karl Decker** ML | 14 February 1925 to 03 April 2024 | Ingelheim/Germany | Biochemistry and Biophysics Section

■ **Klaus Dransfeld** ML | 12 August 1926 to 26 April 2024 | Ermatingen/Switzerland | Physics Section

■ **Friedrich Ehrendorfer** ML | 26 July 1927 to 28 November 2023 | Vienna/Austria | Organismic and Evolutionary Biology Section

■ **Peter Fulde** ML | 06 April 1936 to 11 April 2024 | Dresden/Germany | Physics Section

■ **Fritz Krause** ML | 14 March 1927 to 28 February 2024 | Mainz/Germany | Physics Section

■ **Hans Lutz** ML | 20 March 1946 to 29 March 2024 | Zurich/Switzerland | Veterinary Medicine Section

■ **Achim Müller** ML | 14 February 1938 to 28 February 2024 | Bielefeld/Germany | Chemistry Section

■ **Hans Konrad Müller-Hermelink** ML | 21 June 1943 to 11 May 2024 | Lübeck/Germany | Pathology and Forensic Medicine Section

■ **Peter Noll** ML | 09 September 1936 to 16 February 2024 | Berlin/Germany | Informatics Section

■ **Max Schwab** ML | 01 March 1932 to 13 April 2024 | Halle (Saale)/Germany | Earth Sciences Section

■ **Klaus Starke** ML | 01 November 1937 to 26 January 2024 | Freiburg im Breisgau/Germany | Physiology and Pharmacology/Toxicology Section

■ **Hans Tuppy** ML | 22 July 1924 to 24 April 2024 | Vienna/Austria | Biochemistry and Biophysics Section

New Class I members

■ **Klaus Blaum** ML, Heidelberg/Germany, Max Planck Institute for Nuclear Physics, Physics Section

■ **Sir Peter Bruce** ML, Oxford/UK, University of Oxford, Chemistry Section

■ **Giuseppe Caire** ML, Berlin/Germany, Technical University of Berlin, Informatics Section

■ **Xiaodong Chen** ML, Singapore/Singapore, Nanyang

Technological University, Engineering Sciences Section

■ **Xinliang Feng** ML, Dresden/Germany, Technische Universität Dresden, Chemistry Section

■ **Iryna Gurevych** ML, Darmstadt/Germany, Technical University of Darmstadt, Engineering Sciences Section

■ **Joost-Pieter Katoen** ML, Aachen/Germany, RWTH Aachen University, Informatics Section

■ **Tobias Kippenberg** ML, Lausanne/Switzerland, École Polytechnique Fédérale de Lausanne, Physics Section

■ **Astrid Lambrecht** ML, Jülich/Germany, Forschungszentrum Jülich, Physics Section

■ **Vasilis Ntziachristos** ML, Munich/Germany, Technical University of Munich, Engineering Sciences Section

■ **Beatriz Roldán Cuenya** ML, Berlin/Germany, Fritz Haber Institute of the Max Planck Society, Chemistry Section

■ **Jennifer Rupp** ML, Munich/Germany, Technical University of Munich, Engineering Sciences Section

■ **Wolfgang Soergel** ML, Freiburg im Breisgau/Germany, University of Freiburg, Mathematics Section

■ **Maryna Viazovska** ML, Lausanne/Switzerland, École Polytechnique Fédérale de Lausanne, Mathematics Section

New Class II members

■ **Dirk Bumann** ML, Basel/Switzerland, University of Basel, Microbiology and Immunology Section

■ **Anne Ephrussi** ML, Heidelberg/Germany, European Molecular Biology Laboratory, Biochemistry and Biophysics Section

■ **Eileen E. M. Furlong** ML, Heidelberg/Germany, European Molecular Biology Laboratory, Human Genetics and Molecular Medicine Section

■ **Ute Hentschel-Humeida** ML, Kiel/Germany, GEOMAR Helmholtz Centre for Ocean Research, Microbiology and Immunology Section

■ **Jürgen Knoblich** ML, Vienna/Austria, IMBA – Insti-

tute of Molecular Biotechnology of the Austrian Academy of Sciences (ÖAW), Human Genetics and Molecular Medicine Section

■ **Alessandra Moretti** ML, Munich/Germany, Technical University of Munich, Physiology and Pharmacology/Toxicology Section

■ **Volker Müller** ML, Frankfurt am Main/Germany, Goethe University Frankfurt, Microbiology and Immunology Section

■ **Andreas Nieder** ML, Tübingen/Germany, University of Tübingen, Organismic and Evolutionary Biology Section

■ **Sarah O'Connor** ML, Jena/Germany, Max Planck Institute for Chemical Ecology, Organismic and Evolutionary Biology Section

■ **Holger Puchta** ML, Karlsruhe/Germany, Karlsruhe Institute of Technology (KIT), Agricultural and Nutritional Sciences Section

■ **Chiara Romagnani** ML, Berlin/Germany, German Rheumatism Research Centre Berlin (DRFZ), Microbiology and Immunology Section

■ **Simone Sommer** ML, Ulm/Germany, University of Ulm, Organismic and Evolutionary Biology Section

■ **Elly Margaret Tanaka** ML, Vienna/Austria, IMBA – Institute of Molecular Biotechnology of the Austrian Academy of Sciences (ÖAW), Genetics/Molecular Biology and Cell Biology Section

■ **Kai Tittmann** ML, Göttingen/Germany, University of Göttingen, Biochemistry and Biophysics Section

■ **Christian Ungermann** ML, Osnabrück/Germany, University of Osnabrück, Biochemistry and Biophysics Section

■ **Christian Wirth** ML, Leipzig/Germany, University of Leipzig, Organismic and Evolutionary Biology Section

■ **Rudolf Zechner** ML, Graz/Austria, University of Graz, Agricultural and Nutritional Sciences Section

■ **Marino Zerial** ML, Dresden/Germany, Max Planck Institute for Biology of Ageing, Genetics/Molecular Biology and Cell Biology Section

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Photo credits:

title: Henrik Hofmeister | Leopoldina, page 2:
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Design:

unicom Werbeagentur GmbH, Berlin

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Abbreviations:

ML = Member of the Leopoldina