



Leopoldina
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Leopoldina news

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The future of the oceans

Science academies advise the G7 summit in Elmau on the future
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Editorial

Dear members and friends of the Leopoldina,



The Leopoldina has an important appointment coming up in late April. Together with the six other science academies of the G7

states, it will hand to German Chancellor Angela Merkel the academies' recommendations for the G7 summit in Schloss Elmau this June. This year, the academies will be presenting statements on the topics of antibiotic research, tropical diseases and the future of the world's oceans (see next item).

The science academies of the participating countries have been advising the G7 heads of state and government on selected topics for the past ten years. The collaboration has been working well and has become an important part of the Leopoldina's international activities. The fact that their advice was sought again this year shows that the voice of the science academies is not only being heard in their own countries but on the international stage, too. This is the second time that, as the national academy of the host country, the Leopoldina has assumed the leadership in preparing the recommendations. The Leopoldina last took on this role in the run up to the G8 summit in Heiligendamm in 2007. Back then, the science academies presented statements on the topics of sustainability, energy efficiency, climate protection, and the protection of intellectual property.

The Leopoldina's activities in Heiligendamm were another argument in favour of its being appointed the German National Academy of Sciences. That makes preparing the G7 summit in Schloss Elmau an even more significant occasion for the Leopoldina.

We wish you a thought-provoking read!



On 23 and 24 February, scientists from the G7 academies met in Halle to discuss and compose the statements for the G7 summit this June.

Photo: Markus Scholz

Academies advise participants in G7 summit

Statements on antibiotic resistance, tropical diseases, and the future of the oceans to be handed over in late April

For the past ten years, the national academies of the G7 nations have been preparing joint statements on current topics of political relevance in the run up to the summit meetings between heads of state and government. The national academy of the country where the summit is taking place always assumes the leadership of these activities – so in 2015 that honour falls to the Leopoldina.

This year, the academies are focusing on three specific topics: the rapidly growing number of germs resistant to antibiotics, neglected tropical diseases, and the future of the oceans. In recent months, German experts – many Leopoldina members among them – have drawn up three statements and presented them to their colleagues in the other G7 nations for review.

The motivation behind the first topic is the rising number of infections worldwide caused by antibiotic-resistant bacteria, coupled to a decrease in the number of effective antibiotics. Within this topic, the academies are addressing issues including drug research, the development of antibiotics, and the use of antimicrobial substances.

The second topic focuses on neglected diseases that frequently afflict people in poorer regions of the world. Such illnesses include African sleeping sickness, river blindness, and dengue fever. The

academies are therefore focusing on how to improve and finance research into such diseases and how to better prepare for major outbreaks.

With regards to the future of the world's oceans, the academies are looking at pollution caused by the irresponsible disposal of heavy metals and plastic. Further urgent issues are the rising acidity levels and temperatures of the oceans caused by climate change, and over-fertilisation from nitrogen used in agriculture.

On 23 and 24 February all the international scientists who had worked on drafting the recommendations met in Halle to discuss the statements. The meeting closed with a visit to the Federal Chancellery in Berlin and a discussion with Prof. Lars-Hendrik Röller, the German Chancellor's personal representative for the G7 summits.

The presidents of the G7 academies will officially present the statements to the Chancellor in late April. As part of the dialogue with civil society on G7 activities, which the Chancellor initiated, the Leopoldina has been charged with shaping discussions within the scientific community. It is currently preparing a Science Conference on the three topics addressed in the statements. This will take place in Berlin on 29 and 30 April. (rn)

■ INFORMATION ON G7 CAN BE FOUND HERE

“We must continue promoting Leopoldina topics”

Interview with Leopoldina President Jörg Hacker, who began his second term on 1 March

Prof. Jörg Hacker began his second term as President of the Leopoldina on 1 March; he will continue to lead the German National Academy of Sciences for another five years. Strengthening communication and cooperation are top of his agenda. Christine Werner spoke with Hacker to find out what exactly that means.

Prof. Hacker, you're looking to continue promoting some key Leopoldina topics. What are these likely to be over the coming years?

Hacker: They will definitely include ethical questions relating to biology and the biosciences. This is necessary not least because of developments like those in the UK, where it's now possible for a child to have three parents by replacing the nucleus of the egg cell. Another focus will be the environment, climate and energy, and we will continue working on demographic developments – in this area, we're currently compiling a report on medicine for our aging population.

Over the past year, the Leopoldina has also contributed to discussions relating to science communication. What has been achieved there?

Hacker: We initiated those discussions together with acatech and the Union of the German Academies of Sciences and Humanities. Science communication is often subsumed under the term “acceptance”, meaning that scientists want their work to be accepted in society. But this is not enough, in my opinion. Science must inform the public about new developments in a credible way, whilst disclosing the potential risks as well as the possibilities. We've made good progress on this front. We have advocated high-quality journalism, especially in the field of science journalism. The effect of new media on science communication will be a further consideration over the coming years.

You're looking to strengthen communication. Which areas need help?

Hacker: It's up to the Leopoldina to address topics as they arise and to share its findings with policymakers and the public. We have been very successful in



Jörg Hacker has been President of the German National Academy of Sciences Leopoldina since 2010. His second term began this March.

Photo: Markus Scholz

that over the past five years; our work is increasingly appreciated by researchers. Amongst the general public, however, we have some catching up to do when it comes to promoting our topics. That is why we're looking to develop and expand activities like presentations, podium discussions and publications.

You emphasised that the debates have been conducted in cooperation with other academies. How important are these collaborative projects?

Hacker: They are extremely important, and we work well together. Collaborating with large research organisations is also crucial for us. We put together a report on scientific freedom and scientific responsibility with the German Research Foundation, for example. We looked at the so-called “dual use” problem – the extent to which scientific findings can also be abused. International cooperation is also a priority. We are currently advising the G7

countries on scientific matters relating to the G7 summit. There is also the InterAcademy Partnership, where over 100 national academies are represented. On top of that, we are looking to strengthen links with other organisations.

On an international level, you're a member of the UN Scientific Advisory Board to the United Nations Secretary-General, Ban Ki-moon. What lies ahead this year?

Hacker: This year, we will continue to work on the sustainability targets; in September, the UN General Assembly will decide on the targets for the next 15 years. We'll be meeting in Malaysia in May, and before that I'll be in New York for a conference on the sustainability targets. Our goal is to find ways of scientifically defining parameters that measure sustainability. And of course climate change is an important topic in light of the UN climate conference coming up in Paris this year.

(cwe)

Establishing trust in transplantation medicine

The Leopoldina publishes reform proposals arising from a symposium on organ allocation

For most patients on the waiting list, to receive an organ is to receive extra time. But the number of people waiting for an organ currently exceeds the number of available organs. This situation – the shortage of a valuable commodity – raises questions about the fair distribution of that commodity. The Leopoldina has produced a discussion paper entitled “Transplantation Medicine and Organ Allocation: Problems and Perspectives”, which arose out of an expert symposium in Berlin. In another document, the Leopoldina highlights where areas of conflict arose during that symposium.

Transplant scandals in individual clinics and reports on the declining number of available organs have frequently appeared in various media over the past few months. The criticism and mistrust is aimed not only at the high-profile cases in Göttingen and other clinics, but is increasingly directed at the organ allocation system in general. Against this backdrop, the Leopoldina’s Standing Committees on Health and on Science and Ethics organised a symposium on transplantation medicine in February. It was held in Berlin under the guidance of Prof. Rüdiger Sievert ML.

Symposium on potential reforms to the organ allocation system

The goal was to offer a critical examination of German transplantation medicine and the organ allocation system. Invitations were extended to representatives of different institutions such as the German Medical Association and Eurotransplant, as well as medical practitioners, lawyers and ethicists. The key questions in the expert discussion were: To whom does an organ (donated post mortem) belong? Who receives an organ? What are suitable criteria for deciding on organ allocation – and who decides on these? Who is allowed to perform transplants? Whose responsibility is it to define allocation criteria and make these mandatory? How can the legal protection of patients be ensured? Who should take responsibility for the system as a whole, and under whose supervision? The paper is part of the “Leopoldina Discussion” series and arose out of the expert



Transplant scandals have reduced the public's willingness to donate organs. The shortage of available organs makes transparent criteria for organ allocation more crucial than ever.

Photos: Alexander Rath/Sebastian Drolshagen – fotolia.com

discussion. It analyses some of the central problems in the current system and addresses the various suggestions made at the symposium for reforming the organ allocation system in order to improve public perceptions of transplantation medicine in Germany.

Providing effective legal protection for patients is a key part of this. Patients must be able to appeal against a decision not

to place them on the waiting list, or to remove them from it. This requires clear legal accountability as well as structures that allow decisions to be made at short notice.

Another basic question relates to the allocation criteria: Who defines these criteria and their hierarchy? Medical expertise is a key factor here, yet is by no means the only one. Allocation criteria have a normative dimension, which means that any regulations relating to fundamental rights can only be decided by parliament.

A further aspect is the organisational structure. Up to now, the German Medical Association – working with expert volunteers – has been in charge of monitoring the procedures and their quality. This system has its limitations, however. The task of organising the system and monitoring its quality would be best assigned to an independent institution with full-time employees.

Fewer transplant centres in Germany

The objective of establishing this kind of institution would be to dispel existing affiliations and to ensure long-term trust in transplantation medicine

by ensuring transparent structures and working methods. A final task would be to reduce the number of clinics at which transplants are performed in Germany, on the basis of qualitative criteria. In addition to the surgical procedure itself, the transplant centres should be able to provide the necessary preparatory procedures and aftercare, as well as conducting the relevant research. (sw)

DFG and Leopoldina advise research institutions

Joint Committee on handling security-relevant research begins work

Research plays a fundamental role in ensuring progress. Freedom of research, which is enshrined in the German Basic Law, is a fundamental requirement in this respect. Yet free research is also associated with risks. These risks result primarily from the danger of useful research findings being misused (the “dual-use dilemma”). Legal regulations can only cover these risks to a limited extent. Scientists’ knowledge, experience and freedom give them a special ethical responsibility.

The German Research Foundation (DFG) and the German National Academy of Sciences Leopoldina addressed this responsibility in 2014 in the Statement on Scientific Freedom and Scientific Responsibility, and developed a corresponding set of guidelines. With the aim of helping research institutions in Germany to implement these recommendations, a Joint Committee on the handling of security-relevant research has now begun its work. The issue was also covered in the recent discussion paper “Freedom and Responsibility of Research – do the prospects of success justify the potential risks?”

The joint committee monitors implementation of the recommendations and provides research institutions with appropriate support in this matter. Ideally, Research Ethics Committees will have been established in all German research institutions by 2017. The aim of these committees is to enable the individual institutions



Many areas of science are at risk of having their research findings misused. Picture: davooda - fotolia.com

to autonomously handle and resolve the arguments arising from their work in an appropriate and responsible manner. The Joint Committee will prepare standard texts for implementation of the recommendations and will serve as a point of contact for questions and a platform for exchanging experiences. In cases where an appropriate solution cannot be reached locally, the Leopoldina can also deploy ad hoc working groups. In addition, the Joint Committee will monitor developments in

the field of security-relevant research in Germany and identify potential areas for action. In light of the recommendation to raise researchers’ awareness of issues relating to the “security relevance” of their work, the Committee will organise regular symposia on the topic of “scientific freedom and scientific responsibility”. The first of these symposia was held in November 2014 in Halle. The event was documented in a Leopoldina discussion paper. (jk)

Young scientists explore the digital age

Digitisation, especially the collection and analysis of huge amounts of data, is gaining increasing significance for science. The Young Academy recently addressed the topic in a bilateral conference. From 17 to 19 February, the first joint conference between the Young Academy and the Israel Young Academy was held in Tel Aviv to discuss the subject of “Big Data and the Future of Research in a Digital Age”. Scientists from both academies examined the concrete impact of the “digital turn” on science and scientific practice from a range of disciplinary perspectives.

The conference was a new beginning on two fronts. On the one hand, the foundations were laid for research-based bilateral cooperation with the Israel Young Academy; a second event is scheduled for next year in Germany. On the other hand, the conference was the first in a series of Young Academy events that will address the topic of “big data”. The working group “Art as research?” is looking into how it might be possible to turn measured data into sound. The research is not being con-

ducted solely on aesthetic grounds but also as a consideration as to whether the process of sonification – similar to visualisation techniques – makes it easier to deal with large quantities of data. The “Sound of Climate Data” project will premiere in Bielefeld on 29 April. A new working group on “Big Data”, which was founded at the plenary session this spring, will look at the longer-term consequences for science of the digital revolution. (aw)

Diving into a dark garden of Eden

Presentation and symposium, Class I – Mathematics, Natural Sciences and Engineering

New technologies lead to new discoveries – a point that was proved by marine biologist Prof. Antje Boetius ML (Bremen) with the help of some deep-water robots. She presented amazing images of deep-sea marine life taken by modern manned submersibles, commenting “the creatures provide the flash for the camera themselves”. Boetius explained that since only one thousandth of the organic matter from shallower regions penetrates down to the deep regions of the sea, organisms that live in the darkness of the depths must be specially adapted to survive. For example, bacteria on the seabed gathered around methane sources and thus make use of a completely different energy source. Since the bacteria’s consumption and conversion of methane also has an effect on the Earth’s climate, human intervention in these regions could have far-reaching implications, Boetius warned.

Prof. Monika Henzinger ML (Vienna), explained how internet auctions work. Alongside the usual auction platforms, there are less well-known variants – auctions are also used to determine how advertising is assigned and positioned on certain websites. Henzinger said that the “Ad Exchange” programmes were like a marketplace adapting in real time down to the millisecond. They allow search engine providers to collaborate with advertising networks in order to maximise reach. The more information available about a user, the higher the potential revenues. Henzinger stated that economists and computer scientists are conducting research into how these different actors interact, as well as into how to achieve more stable pricing.

Laser research for a new kind of cancer therapy

“How can laser research improve cancer therapy?” was the question tackled by Prof. Roland Sauerbrey ML (Dresden). He pointed out that laser beams not only concentrate huge amounts of energy, they also exert extremely high pressure. He explained how a current pilot project is attempting to take advantage of these properties for cancer treatment. The aim is to use ion radiation instead of photon radiation. However, intensive research

New members of Class I



The new members of Class I are presented with their membership certificates: From left: Prof. Luisa de Cola (Strasbourg), Prof. William Durham (Cambridge, USA), Leopoldina Secretary-General Prof. Jutta Schnitzer-Ungefug (Halle), Prof. Ulrich Platt (Heidelberg), Prof. Christine Silberhorn (Paderborn), Prof. Ali Mehmet Celâl Şengör (Istanbul), Prof. Roland Sauerbrey (Dresden), Prof. Monika Henzinger (Vienna), Prof. Detlef Günther (Zurich), Prof. Ulrike Lohmann (Zurich), Leopoldina President Prof. Jörg Hacker (Halle), Prof. Reimund Neugebauer (Munich), Prof. Joachim Cuntz (Münster), Prof. Marc Levine (Essen), Prof. Katharina Al-Shamery (Oldenburg), Prof. Michael Grätzel (Lausanne) and Prof. Dierk Raabe (Düsseldorf).
Photo: Markus Scholz

and testing are still needed to ensure reliable conditions for the clinical use of this new procedure.

Prof. Luisa de Cola ML (Strasbourg) offers an equally interesting perspective on the subject. With the help of supramolecular chemistry, she is seeking to create “vehicles” for facilitating transport of biologically active agents into cells. This project is currently in its initial phases; in the long-term, however, de Cola thinks that the results could benefit material sciences as well as medicine.

Simple designs for offshore wind farms

Prof. Michael Struwe ML (Zurich), impressed audiences with his methods for calculating minimal surfaces. The specialist in geometric analysis and calculus variations explained the mathematical

problem using videos showing the surface tension in soap bubbles.

Prof. Hermann-Josef Wagner ML (Bochum) gave a presentation on the latest findings relating to the use of wind energy. The costs for offshore wind energy are currently three times higher than those for suitable onshore sites. The goal is therefore to develop simpler, robot-supported, low-maintenance systems for offshore wind farms. In any case, said Wagner, the electricity grid must be expanded, with new transmission routes. He concluded that Germany now only has a special role when it comes to the speed at which the energy supply is transitioning. (ca)

EASAC gives recommendations on extreme weather before the European Parliament

European Academies Science Advisory Council discusses advisory strategies for Brussels in presidium meeting in London

The presidium of the European Academies Science Advisory Council (EASAC) met from 16 to 18 February at the Royal Society in London. EASAC is the association for national academies of science of the EU member states. In talks with the president, Sir Paul Nurse, the presidium discussed how member academies can further strengthen the association and gain even greater recognition for their collective, independent voice as providers of scientific advice to policymakers in Brussels.

How can the scientific community advise European policymakers?

The departure of the Chief Scientific Advisor to the President of the European Commission was once again discussed, as were the Commission's plans to create a new structure for the involvement of scientific expertise in shaping European policy.

A meeting with Julie Maxton, Executive Director of the Royal Society, Sir Mark Walport, Chief Scientific Advisor to the

British government, and Robin Grimes, Chief Scientific Advisor to the British Foreign Office, also addressed the international dimensions of EASAC's work. One example is the cooperation with the Network of African Science Academies (NASAC) on the topic of green genetic engineering.

Joint presentation with the Royal Society

Furthermore, on 3 March, EASAC and Britain's Royal Society organised a joint briefing on the topic "Adaptation and Resilience" for MEPs in Brussels. EASAC made recommendations for adaptation to extreme weather events in Europe, with a presentation of the key findings of the 2013 report "Adaptation to Extreme Weather" by Prof. Lars Walloe.

Walloe, a representative of the Royal Society who in 2014 published the report "Resilience to Extreme Weather", placed particular emphasis on the importance of improving resilience among populations and societies in developing countries. (cd)

Leibniz-Lecture in New Delhi



The Leopoldina held the first Leopoldina-Leibniz Lecture on 20 January in New Delhi, in cooperation with the German Research Foundation (DFG). Prof. Brigitte Röder ML, who was awarded the Gottfried Wilhelm Leibniz Prize in 2014, presented her research on neuroplasticity in the blind under the title "Age Dependent Learning Plasticity in Humans". The Leopoldina-Leibniz Lecture took place in the German House of Science and Innovation in New Delhi and also served as the keynote speech for the New Year reception at the DFG's Indian office.

rn/Foto: Ruth Narmann

Human Evolution towards Language: How brain and speech depend on one another

Leopoldina and Indian National Science Academy (INSA) symposium in Pune

For several years, the Leopoldina and the Indian National Science Academy (INSA) have held a joint series of conferences to discuss current topics. The most recent conference in the series took place in Pune in India on 15 and 16 January. Prof. Angela Friederici ML of the Max Planck Institute for Human Cognitive and Brain Sciences and INSA member Prof. L. S. Shashidhara of the Indian Institute of Science Education and Research (IISER) were responsible for the scientific coordination of the event, where Indian

and German scientists discussed the connection between the brain and speech in a symposium entitled "Human Evolution towards Language: From Genes to Behaviour". Keynote speeches were given by Prof. A. Friederici and by Prof. Partha P. Majumdar of the National Institute of Biomedical Genomics.

Equally high interest among researchers and young scientists

Subjects included neuropsychological perspectives, a look at current neuropsych-

ological and neurobiological research, and genetic approaches in this field of research. INSA president Prof. Raghavendra Gadagkar ML said that the symposium tackled a research field in which few scientists in India work but where the existing research is at a very high level. Prof. Frank Rösler, who attended the symposium as a representative of the Leopoldina Presidium in India, said that the interest among researchers and young scientists was equally high. (rn)

Report and statement available in English

The Report on Tomorrow's Science "Life sciences in transition: Challenges of omics technologies for Germany's infrastructures in research and teaching" is now available in English. The Report presents an overview of new technologies opening up entirely new possibilities of analysing life processes. Using omics technologies, different biomolecules, for example DNA, RNA, proteins or metabolites, can be detected in living organisms almost in their totality. The Report on Tomorrow's Science presents a clear diagnosis: Germany is not adequately prepared for the rapid developments in omics technologies, par-

ticularly the information technology requirements of these technologies.

Socialisation in early childhood

In their statement "Socialisation in early childhood - Biological, psychological, linguistic, sociological and economic perspectives", the German National Academy of Sciences Leopoldina, acatech – the National Academy of Science and Engineering, and the Union of the German Academies of Sciences and Humanities are calling for long-term investments in the high-quality education and care of small children. In their statement, the

academies emphasise that opportunities for children whose family environments are less conducive to learning could be greatly improved. The researchers also recommend that education policy considerations pay greater attention to the close interplay between nature and nurture in children's development. The statement is now available in English. (jk)

■ THE REPORT IS AVAILABLE [HERE](#)

■ THE STATEMENT CAN BE FOUND [HERE](#)

People

Deceased Members and Honorary Sponsors

■ Klaus Sander ML

17 January 1929 – 21 February 2015
| Freiburg
Organismic and Evolutionary Biology

Biologist Klaus Sander's research focused on pattern formation in the embryonic development of insects. He was able to show that the formation of the head and abdomen of cicadas is determined by material factors that can be found at different places in the egg. The Leopoldina elected him as a member in 1989.

■ Udo Taubeneck ML

12 May 1928 – 19 January 2015 | Rudolstadt
Genetics/Molecular Biology and Cell Biology

Udo Taubeneck, who was elected a member of the Leopoldina in 1974, spent his scientific career researching the properties of penicillin. He was interested in the composition and structure of manufactured bacterial cultures with no cell walls and the role of the bacterial cell wall in the absorption and release of substances.

■ Hans F. Zacher

22 June 1928 – 18 February 2015 | Starnberg

Hans F. Zacher's fields were the history

of social law, the socio-political achievements of international institutions, and comparative social law. An honorary sponsor of the Leopoldina, Zacher was Director of the Max Planck Institute for Foreign and International Social Law and President of the Max Planck Society (1990 to 1996). Following German Reunification in 1990, he went on to make an especially valuable contribution to the Leopoldina and sought to develop the research landscape in the east German states.

Newly elected Members

■ **Wolfgang Stroebe ML**, Utrecht University, Institute of Psychology (Psychology and Cognitive Sciences Section)



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Abbreviations:

ML = Member of the Leopoldina-