



Leopoldina
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Leopoldina news

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Evolution in schools and universities

Leopoldina publishes statement on the principle of biological knowledge

G7 AND G20 SUMMITS

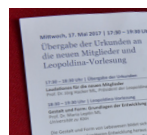
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speakers in focus

Editorial

Dear Members and Friends of the Leopoldina,



The world's science academies have been busy: First, there was the meeting in January to draft the Science20 state-

ment, followed by the Science20 dialogue forum in March, where the final statement "Improving Global Health" was delivered to German Chancellor Angela Merkel for the upcoming G20 summit. Also in March, a workshop was held in preparation for the G7 summit, where recommendations were developed on cultural heritage, neurodegenerative diseases and the role of science, technology, innovation and infrastructure in economic growth (see article opposite). These documents were handed over to the Italian government in May at the G7 Science Conference. The statements from the international scientific community are eventually received by heads of state and government at the summit meetings: the G7 took place on 26 and 27 May in Taormina, Italy, and the G20 will be held on 7 and 8 July in Hamburg.

These first few months of 2017 have therefore seen the tying together of all the various threads that make up the central task of the German National Academy of Sciences Leopoldina: international policy advice. To date, the Leopoldina has led this process on three occasions: in 2007 for the G8 in Heiligendamm, in 2015 for the G7 in Elmau and now this year for the G20 in Hamburg.

What began ten years ago with the drafting of the first science-based statement for a G8 summit meeting has now become a regular and almost self-evident task for the national academies of the world's leading industrialised and emerging nations: giving science a voice in global political discourse

I wish you a thought-provoking read.

Jörg Hacker

Cultural heritage, aging population and new economic growth

National academies prepare statements for the G7 summit



The president of the Italian Accademia dei Lincei chairs the G7 science academies' meeting.

Photo: Accademia dei Lincei

Under the leadership of the Italian Accademia Nazionale dei Lincei, the national academies of the G7 countries Germany, France, the United Kingdom, Italy, Japan, Canada and the United States compiled recommendations to be presented to heads of state and government at the G7 summit held on 26 and 27 May in Taormina, Italy.

The three statements provide policy recommendations on the topics of cultural heritage and building its resilience to natural disasters, neurodegenerative diseases in an aging population, and the role of science, technology, innovation and infrastructure for economic growth. Several members of the Leopoldina made a significant contribution to developing these statements.

Prof. Hermann Parzinger ML led in the drafting of the cultural heritage statement, Prof. Frank Rösler ML coordinated the statement on neurodegenerative diseases, and Prof. Regina Riphahn ML oversaw the recommendations on new economic growth. These three experts also participated in the writing session held in March

at the Accademia dei Lincei in Rome.

The presidents of the G7 science academies handed over the final statements to the Italian ministers of economics and cultural heritage at the G7 Science Conference held on 3 May, also in Rome. In his speech, Leopoldina President Prof. Jörg Hacker outlined the Leopoldina's international policy advice activities, particularly in the context of the G7 and G20 summits. The event ended with a meeting between the academy presidents and President of the Italian Republic, Sergio Mattarella, at the Quirinal Palace.

Advising the various heads of the G7 states is one of the Leopoldina's main tasks when it comes to international policy advice. In collaboration with the national science academies of the other

G7 countries, the Leopoldina identifies topics of importance to the scientific community that are in line with the focus of the G7 summit, but that also broaden the political focus of the meeting. (mkk)

LOOKING AHEAD TO THE G20

The statements have been submitted to the governments, but there remains work to do. At the Science20 dialogue forum, the national science academies of the G20 states delivered their joint statement on improving global health to German Chancellor Angela Merkel. Directly afterwards, Leopoldina President Jörg Hacker ML presented the statement to the key representatives of the G20 states (known as sherpas) at their meeting in Frankfurt am Main, and discussed the academies' recommendations with these representatives in preparation for the G20 summit in Hamburg on 7 and 8 July. (chw)

■ STATEMENTS OF THE G7 SCIENCE ACADEMIES

Evolution – the guiding principle

Leopoldina publishes recommendations on evolutionary biology in research and education

Antibiotic resistance, the Zika virus and EHEC germs – in the past few years, dangerous pathogens have been a concern for the public and policymakers. Why do germs suddenly produce dangerous variants? And what lies behind this variability of organisms? The field of evolutionary biology seeks to answer these questions. Both examples show why evolutionary biology is both an important area of knowledge and of direct social significance.

The German National Academy of Sciences Leopoldina illustrates this in its statement “Evolutionary biology education in schools and universities”, which was published in mid-April. Led by Prof. Diethard Tautz ML (Max Planck Institute for Evolutionary Biology, Plön) and Prof. Ute Harms (Leibniz Institute for Science and Mathematics Education, Kiel), evolutionary biologists and biology education experts give recommendations on how to improve the position of evolutionary biology in schools and universities.

Insights from evolutionary biology in medical practice

Ancestry research is arguably the most well-known branch of evolutionary biology research. Using DNA sequence comparisons, scientists are able to carry out kinship analysis and reconstruct family trees. They can then use this information to trace the viral origins of an influenza pandemic and, in some cases, make predictions about future outbreaks. This allows appropriate vaccines to be produced in good time.

HIV transmission paths and the causes of genetic diseases can also be traced in this way. Forensic techniques and molecular markers, which were developed based on evolutionary biology research, can also be used for paternity testing and in criminology. Furthermore, evolutionary game theory can be applied to give us new insights into cancer treatment. Cancer cells are independent clones that develop their own evolutionary dynamic.

To treat these effectively with chemotherapy drugs, evolutionary biologists recommend considering the dynamics of the genesis and spread of resistant cells. Evolutionary biology has become an important part of general education due to



The latest Leopoldina statement examines the relevance of evolutionary biology in schools and universities.

Photo: Axel Kunz

its natural history aspect. Where do humans come from? What makes us unique? What effect does culture have on evolution? By grappling with these questions, evolutionary biology opens doors to understanding our own human nature, our interactions with the environment and other people, and our economic activity and cultural development.

Models from evolutionary biology show us ways of solving conflicts of interest, both within social groups and in an ecological context. Given its growing importance in recent decades, the Leopoldina sees the need for evolutionary biology to be better embedded in school and higher education curricula.

Consequently, the statement argues in favour of a thorough stocktaking of the current situation in research and teaching and proposes setting up a federal coordination group. The paper recommends that universities assign a more central and interdisciplinary role to the theory of evolutionary biology.

For schools, the authors argue that evolutionary biology should be establis-

hed as a core theme running through biology teaching from Grade 5. Abstract concepts and models should also be taught by means of illustrative examples and experiments, for which evolutionary biology research provides a wealth of topical and fascinating material.

Potential of evolutionary research for schools and universities

“Let’s learn with Darwin,” wrote the journalist Jürgen Kaube in an article a few years ago, pointing out the great potential of evolutionary biology for school education. The theory of Charles Darwin is not just another piece of knowledge, it also trains thinking.

After all, evolutionary biology shows us how to develop solutions to complex problems. A nationwide framework curriculum could ensure that young people are introduced to evolution much earlier on in their schooling. (ca)

■ STATEMENT ON EVOLUTIONARY BIOLOGY EDUCATION (IN GERMAN ONLY)

Shape and form in embryonic development

Leopoldina Lecture and Life Science Symposium reflect scientific diversity of Class II

Class II – Life Sciences of the German National Academy of Sciences met on the 17 and 18 May for the Leopoldina Lecture and Leopoldina Life Science Symposium. After the new members were elected, new member Professor Maria Leptin ML opened the scientific debate with her lecture on the interaction between shape and form in the development of organisms.

Maria Leptin, biologist and immunologist at the University of Cologne, addressed questions that have occupied generations of thinkers: How do we emerge? How do we develop? While in the 17th century the homunculus was a symbol of human development, the rise of the natural sciences shed new light on the embryonic development of organisms. Nevertheless, there are still gaps in our knowledge.

Work with model organisms has especially contributed to our present understanding of the subject. Studies on the embryonic development of fruit flies and mice on the one hand, and of humans on the other, have shown that the physiological processes are, in principle, comparable. Therefore scientists are using fruit flies and mice to explore the early formation of the embryo.

Maria Leptin is particularly interested in a specific phase of embryonic development of the fruit fly *Drosophila* – that in which a multilayer embryo is formed from the blastocyst, a single layer of cells around a fluid-filled cavity. A “pouch” of cells forms on one side of the embryo in a process known as gastrulation, which causes the stomach, back, and head of the embryo to become visible. Leptin and her team have been studying how this process works for some 20 years now. Using advanced microscopy technologies, they were able to show that the sudden gastrulation of the cells starts in the cytoskeleton. As it contracts, the cells on the stomach side of the embryo change shape, finally forming a groove and moving inside the blastocyst.

This finding raised new questions about the nature of cells. Since the contraction of the cytoskeleton causes some cells to change shape, these cells must be soft. At the same time, the neighbouring

The new members of Class II



On 17 May, the new members of Class II received their membership certificates from Leopoldina President Prof. Jörg Hacker ML (Halle) (far right). From left to right: Prof. Albert Osterhaus ML (Hanover), Prof. Veit Hornung ML (Munich), Prof. Rolf Müller ML (Saarbrücken) and Leopoldina Secretary-General Prof. Jutta Schnitzer-Ungefug (Halle). Continuing, left to right: Prof. Christian M.T. Spahn ML (Berlin), Prof. Sabeeha Merchant ML (Los Angeles, USA), Prof. Ekkehard Neuhaus ML (Kaiserslautern), Prof. Anita Rauch (Schlieren, Switzerland), Prof. William E. Evans ML (Memphis, USA), Prof. Rajeev Kumar Varshney ML (Patancheru, India), Prof. Alexander Pfeifer ML (Bonn), Prof. Ingrid Fleming ML (Frankfurt am Main), Prof. Eicke Latz ML (Bonn) and Prof. Maria Leptin ML (Cologne).

Photo: Markus Scholz

cells need to somehow support this change in cell shape and location. The team investigated all the cells and found that only the stomach and back cells are pliable. In contrast, the cells on the sides of the embryo are firmer, and provide enough resistance to relocate the soft cells inside the blastocyst. This means that the characteristics of all of the cells are crucial to the formation and shaping process.

Next, Leptin and her colleagues want to find out how the cytoskeleton changes during formation. To do this, they will first develop simulations and models of how the cytoskeleton behaves, and use these as a basis for developing theories about the complex interactions between its individual filaments. The scientists are currently testing their assumptions in practice.

On the following day, ten more new members introduced their research at the Life Science Symposium. They covered a

broad range of methodological issues, scientific subjects and geographical perspectives. In their lectures, Professor Albert Osterhaus ML and Professor Rolf Müller ML addressed the matter of infectious diseases. Professor Ingrid Fleming ML and Professor Alexander Pfeifer ML discussed broader and narrower issues around obesity and diabetes mellitus. Professor Veit Hornung ML and Professor Eicke Latz ML turned their attention to different aspects of research on the immune system.

Professor Christian M.T. Spahn ML shared his insights into cryo-electron microscopy, and Professor Sabeeha Merchant ML discussed the metabolism of trace elements. Lastly, Professor Ekkehard Neuhaus and Professor Rajeev Varshney completed the multifaceted picture with lectures on plant breeding and genomics in agriculture.

(hst)

Digitisation symposium: “Discussing pros and cons”

Different perspectives on the impact of the digital revolution

We surf the internet, send text messages and read e-books; we participate in online courses, have our grass cut by robotic lawn mowers and stay in touch via social media networks – where posts and responses are increasingly generated by so-called social bots. Digital technology has become an integral part of our daily lives. What are the consequences of this phenomenon on how we live, on our interactions with one another, and on society as a whole? On 10 and 11 July, experts from diverse disciplines will discuss the implications of digitisation at a Leopoldina symposium.

Steffen Staab: “Opinion manipulation is a business”

One of the symposium speakers is Prof. Steffen Staab, founder of the Institute for Web Science and Technologies at the University of Koblenz-Landau. He carries out research into how the internet is used to form opinions. “Opinion manipulation via the internet is a genuine business,” he says. Abstruse statements, manipulated images and “fake news” are mainly used to generate a high number of clicks. These frequently clicked links produce advertising revenue, thus creating a “click-rate economy”. Political actors also try to influence decisions via the internet by disseminating an increasing number of false reports.

How do we address this problem? Should we retaliate, or does that only draw more attention to the fake news in the first place? These are questions that have yet to be resolved, says Staab. In this respect, the symposium will provide a useful platform to discuss all aspects of the phenomenon from various perspectives and enable participants to learn from one another.

Elisabeth André: “Robots are becoming companions”

Many digital technologies and robots we use every day feature intuitive user interfaces. This combination of human and machine is the research focus of Prof. Elisabeth André ML, professor of human-centred multimedia at the University of Augsburg. André sees enormous potential in interaction techniques that are based on

gestures, facial expressions and language. She mentions the interaction between people and household or care robots as a prime example of simulated communication and social skills. “In the future, these robots will acquire the role of a housemate or companion,” André believes. Yet it is important, she adds, that people are still able to control the technology. As digitisation has a controversial status within society, André expects the symposium to trigger lively debate and hopes to come away with plenty of food for thought on the design of human-machine interfaces.

Helge Ritter: “Helping the brain to think”

Digitisation brings with it new learning pathways and new challenges for the learner. At the same time, robots, virtual worlds, and smart interaction systems provide new opportunities to activate our own abilities. “In this way, digital technology contributes to lifelong learning,” explains Prof. Helge Ritter, spokesman for the Cluster of Excellence Cognitive Interaction Technology (CITEC). By targeting specific areas to be trained, assistance and learning systems of the future could, he says, actually help the brain to think.

Given the tendency for each scientific discipline to only see things from its own perspective despite developments occurring in many different fields, Ritter sees the symposium as an important platform for exchanging ideas. According to him, only by going beyond the boundaries of one’s specific area of expertise can the pros and cons really be discussed and weighed against each other.

(cwe)



Steffen Staab will speak about the dynamics involved in the formation of public opinion.



The interaction between man and machine will be focus of Elisabeth André’s talk.



Helge Ritter will address the impact of digital technologies on cognition and learning.

Photos (3): private

LEOPOLDINA SYMPOSIUM IN BERLIN ON 10 AND 11 JULY

On 10 and 11 July, computer scientists, sociologists and ethicists will come together to discuss and debate the opportunities and risks of digitisation, and how it can influence opinion-forming processes. This event, titled “Digitisation and its effects on people and society”, is jointly hosted by the Leopoldina, acatech and the Union of German Academies of Sciences and Humanities. The scientific direction lies in the hands of Prof.

Thomas Lengauer ML, member of the Leopoldina Presidium and director of the Max Planck Institute for Informatics in Saarbrücken. The symposium, which is supported by the Alfred Krupp von Bohlen und Halbach Foundation, will be held at dbb Forum Berlin (Friedrichstraße 69) and is open to the public and free of charge.

■ INFORMATION AND REGISTRATION (IN GERMAN ONLY)

Learning from the financial crisis

German-Israeli symposium on regulating the economy and financial sector

The recent financial crisis in Europe and the resulting governmental measures have intensified debates in the financial and business sectors on the regulation and implementation of legal, ethical and behavioural norms. In light of this situation, the Israel Academy of Sciences and Humanities and the Leopoldina held the symposium “Law and Economics” in early April to discuss these issues from a scientific perspective.

The key focus areas were “Banks and Banking”, “Enforcement of Norms”, and “Behavioural Law and Economics”. The event was organised by Prof. Klaus Hopt ML of the Max Planck Institute for Comparative and International Private Law in Hamburg, and Prof. Menahem Yaari, former President of the Israel Academy of Sciences and Humanities.

Participants analysed the three main topics in the form of lectures and discussions. A highlight of the event was the evening panel discussion “Corporate Regulation and Corporate Ethics”, which was opened by a welcome address from



The panel discussion discussed alternative ways to exercise control over markets. Photo: David Ausserhofer

Israel’s ambassador to Germany, Yakov Hadas-Handelsman. The discussion focused on the effects of (over)regulation and potential alternatives in the areas of self-regulation and business ethics.

Participants in the panel discussion included Prof. Nili Cohen, president of the

Israel Academy of Sciences and Humanities, Prof. Wolfgang Schön ML of the Max Planck Institute for Tax Law and Public Finance in Munich and Prof. Christine Windbichler ML of the Humboldt-Universität zu Berlin.

(jn)

Science platform for sustainability

Leopoldina president advises on UN development goals

Scientific expertise is required to ensure successful implementation of the United Nations’ Sustainable Development Goals (SDGs) and Germany’s associated National Sustainable Development Strategy. In response, the German federal government created an SDG Science Platform to more formally and thoroughly integrate science into the German sustainability framework. Leopoldina President Prof. Jörg Hacker was appointed ad personam to this steering group in April 2017. The SDG Science Platform aims to provide a broad scientific overview of how the implemen-

UN DEVELOPMENT GOALS

End poverty, protect the climate, improve education – these are three of the 17 Sustainable Development Goals (SDGs) that the United Nations wants to achieve by 2030. The UN’s objective is to bring all member states together to tackle the urgent problems facing humanity. The individual countries can contribute to these efforts by creating their own working groups, such as the SDG Science Platform.

tation of these sustainable development goals is progressing. By proposing solutions and courses of action, an important impetus will be provided for the support and realisation of the 2030 Agenda and Germany’s Sustainable Development Strategy. The SDG Science Platform was introduced by Federal Minister of Education and Research Prof. Johanna Wanka and Head of the Federal Chancellery Peter Altmaier at the 13th Forum for Sustainability, hosted by the German Federal Ministry of Education and Research (BMBF) in Berlin. (chw)

Out of the labs and onto the streets

On 22 April, the international March for Science saw 37,000 people take to the streets in 22 locations around the globe, according to information from the organisers.

More than 600 local initiatives coordinated the event, which sought to promote freedom of scientific research and the importance of science for society, and to protest against the politically motivated relativisation of scientific findings.

The Alliance of Science Organisations in Germany, which the Leopoldina joined in 2008, issued a statement in support of the demonstrations.

The large media response to the march showed that it could be the beginning of a strong public commitment by scientists to find new ways to help society gain a better understanding of research methods and findings. (art)

Leopoldina Lecture by Nobel laureate Edvard Moser



On 15 May, more than 300 scientists and science lovers attended the lecture of Nobel Prize winner Edvard Moser ML. He vividly explained his research on spatial thinking, including how one's sense of orientation develops early in life and why certain patterns in the brain were formed through evolutionary processes. Following the lecture, many of the young researchers in attendance took advantage of the opportunity to speak directly with the renowned neuroscientist.

Photo: Christof Rieken

Feeding the world sustainably

International academies meet to discuss food security, nutrition and agriculture

How can we ensure that the entire world's population has access to enough food? How can sustainable agriculture be promoted and harmful environmental impacts be minimised? The InterAcademy Partnership (IAP), which brings together science academies from around the world, launched the project "Food and Nutrition Security and Agriculture" in 2015 to address precisely these questions.

In early April, experts from more than 20 countries met at the Leopoldina as part of this project. The four working groups

from Europe, Africa, the Americas and Asia-Pacific presented drafts of their regional reports and discussed preliminary findings from their analyses.

The scientists were in unanimous agreement that a closed-loop, ecological economy is required in order to reduce food waste within the supply chain and in private households. The groups also agreed that science should play a key role in developing holistic food system approaches, for example optimising agricultural production by introducing new techno-

logies. Prof. Volker ter Meulen, project leader and co-chair of the InterAcademy Panel for Science, said: "There have already been reports published on the topics of food security and nutrition. However, these reports were never formulated from a purely scientific perspective. This project will identify for the first time approaches where science can make an impact."

In 2018, the four reports from the IAP's regional networks will be compiled into one global statement.

(csd)

European academies examine genome editing

EASAC report sheds light on the perspectives of scientists, policymakers and the public

In early May 2017, the latest report of the national science academies of the EU member states, Norway and Switzerland, which together form EASAC, was publicly launched in Brussels.

This report, 15 months in the making and titled „Genome Editing: Scientific opportunities, public interests, and policy options in the EU“, was prepared under the direction of former Leopoldina president Prof. Volker ter Meulen ML, who

also chairs the EASAC Biosciences Steering Panel.

More than 80 representatives and staff members of the European Commission and European Parliament as well as various interest groups represented in Brussels attended the launch of the report and its recommendations. Prof. Robin Lovell-Badge, head of the Division of Stem Cell Biology and Developmental Genetics at the Francis-Crick-Institute in London,

spoke on the issue of genome editing in human cells. The panel discussion included Prof. Joachim Schiemann (Julius Kühn Institute, Quedlinburg), Prof. Bert Rima (Queens University Belfast), Prof. Klaus Tanner (University of Heidelberg) and Charles Kessler (European Commission, DG RTD).

(csd)

A role model for the ethical responsibility of science

The Leopoldina mourns the loss of Prof. Gebhard Kirchgässner, spokesperson of Class IV

BY PROF. DR. LARS P. FELD ML*

For many years, the economic model of behaviour has experienced criticism and success in equal measures. Most frequently, it is the assumptions of self-interest and rationality that come under attack. Nevertheless, this approach makes substantial assertions about social cohesion that go beyond the purely economic sphere.



Prof. em. Dr. Gebhard Kirchgässner. Photo: private

Those who want to understand why this is the case need to have read *Homo oeconomicus* by Gebhard Kirchgässner. In his book, Kirchgässner not only demonstrates the capabilities and limitations of this approach, but also considers its role in scientific theory and thus provides evidence of its success. The German-language

book is now in its fourth edition – the last to be authorised by Kirchgässner. After completing his master's, doctoral and postdoctoral studies at the University of Konstanz, Gebhard Kirchgässner went on to teach economics at Osnabrück University from 1982 to 1994 and at the University of St. Gallen in Switzerland from 1992 until his retirement in 2013. He advised policymakers in various expert and consultant roles, for example as a member of the Swiss Federal Commission for Economic Policy (KfK) from 1997 to 2007, and as president of the Commission from 2004 to 2007.

He also held a number of voluntary positions, for example in the Verein für Socialpolitik, of which he was eventually made ombudsperson for ethical matters. He became a member of the Leopoldina in 2001, most recently occupying the position of spokesperson of Class IV: Humanities, Social and Behavioural Sciences.

Gebhard Kirchgässner was one of leading exponents of the economic theory known as New Political Economy. He carried out important work in this field of research, in particular on electoral behaviour, political business cycles and the economic impact of various constitutional

frameworks. Yet due to his many interests – not least his methodological interests – his work covers a broad spectrum from philosophy to econometrics, and addresses a number of topics in the fields of micro and macroeconomics, economic policy and finance.

In both his professional and personal undertakings, Gebhard Kirchgässner was a principled man who believed in the social responsibility of scientists. His chief concern was ensuring a rigorous analysis – and seeing that such an analysis was reflected in economic policy recommendations.

Gebhard Kirchgässner died on 1 April 2017, just two weeks before his 69th birthday, after a long battle with serious illness. He leaves behind a great void not only in the field of economics. We have lost an esteemed scientist who has been denied the possibility of bringing his diverse research projects to fruition. We mourn the loss of a true and loyal friend.

* Lars P. Feld has held the chair in Economic Policy and Constitutional Economics at the University of Freiburg since 2010 and is the current director of the Walter Eucken Institute. He became a member of the Leopoldina in 2008.

Personalia

New Members of Class I

■ **Ignacio Cirac ML**, Garching, Max Planck Institute of Quantum Optics (Physics Section)

■ **Donald B. Dingwell ML**, Munich, Department of Earth and Environmental Sciences, Ludwig Maximilian University (Earth Sciences Section)

■ **Huajian Gao ML**, Providence, USA, Brown University, School of Engineering (Engineering Sciences Section)

■ **Matthias Scheffler ML**, Berlin, Fritz Haber Institute of the Max Planck Society (Physics Section)

■ **Cordelia Schmid ML**, Montbonnot, France, Inria Grenoble – Rhône-Alpes Research Center (Informatics Section)

■ **Peter Scholze ML**, Bonn, Mathematical Institute, University of Bonn (Mathematics Section)

■ **Ulrike Tillmann ML**, Oxford, United Kingdom, University of Oxford, Mathematical Institute (Mathematics Section)

■ **Dirk Trauner ML**, New York, USA, Department of Chemistry, New York University (Chemistry Section)

■ **Alexander Waibel ML**, Karlsruhe, Institute for Anthropomatics and Robotics, Karlsruhe Institute of Technology (Engineering Sciences Section)

Deceased Members

■ **Per Brandtzæg ML**
9 June 1936 – 11 September 2016 | Oslo, Norway

Pathology and Forensic Medicine

Norwegian scientist Per Brandtzæg was one of the leading researchers in the field of immunobiology and immunopathology, with a special focus on the gastrointestinal tract and the oral cavity. He set new standards through his fundamental work on the secretory immune system and on the structure and functionality of the polymers IgA und IgM. Brandtzæg was co-founder of the renowned Laboratory for Immunohistochemistry and Immunopathology (LIIPAT) at the University of Oslo's Institute of Pathology, which he also headed for many years. Since the 1980s, Brandtzæg had been considered the most cited Norwegian scientist. Per Brandtzæg was elected a member of the Academy in 1997.

■ **Horst Köditz ML**
6 May 1931 – 16 April 2017 | Magdeburg

Gynaecology and Paediatrics

The Jena-born paediatrician Horst Köditz was a scientist, professor and clinic director. He conducted research in the field of paediatric infectiology, on which he published a number of major studies. His work on preventing severe intestinal infections in preschool children through immunoprophylaxis was highly praised. He also successfully evaluated the compatibility of a previously untested live vacci-

ne consisting of attenuated enteritis coli bacteria. From 1973 to 1997 Köditz led the Clinic for Paediatrics in Magdeburg. Horst Köditz was inducted into the Academy in 1987.

■ **Franz Huber ML**
20 November 1925 – 27 April 2017 | Starnberg
Organismic and Evolutionary Biology

Franz Huber conducted research on the nervous systems and behaviour of insects. He investigated, among other topics, the neural foundations of frequency and pattern analysis and the hormonal control of reproductive behaviour. Huber was considered one of the founders of neuroethology, a field of research that combines neurology neurobiology and sensory physiology. Franz Huber was elected a member of the Leopoldina in 1974.

■ **Igor R. Šafarevič ML**
3 June 1923 – 19 February 2017 | Moscow, Russia
Mathematics

Russian mathematician Igor R. Šafarevič conducted research in the field of algebraic geometry. His studies contributed significantly to the understanding of elliptic curves. Šafarevič was considered one of the leading mathematicians in Russia, and was also held in high esteem internationally. Alongside his scientific work, Šafarevič advocated for the rights of opposition members in the Soviet Union. Igor R. Šafarevič was elected a member of the Academy in 1960 at the age of 37.



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Abbreviations:

ML Member of the Leopoldina