

Leopoldina

news

Deutsche Akademie der Naturforscher Leopoldina –
Nationale Akademie der Wissenschaften

Halle (Saale), 9 December 2010 **05/2010**

Paper on genetic diagnostics examines the future of medicine

Academies' recommendation met with a vigorous response and
caused lively discussion on its presentation to the public in Berlin



The members of the Academy group, Urban Wiesing, Peter Propping ML and Claus R. Bartram ML (top, from left to right) engaged in a lively discussion with the audience in a full function room (below).

Photograph: Ekko von Schwichow

On 10 November a statement by the Academy group “Predictive Genetic Diagnostics as an Instrument of Disease Prevention” was presented in Berlin by the Leopoldina, acatech and the Berlin-Brandenburg Academy of Sciences and Humanities (for the Union of the German Academies of Sciences and Humanities), looking into new developments in medicine: What is genetic diagnostics? What possibilities does it open up regarding disease prevention and treatment? What

must be its limits? How should society deal with this medical revolution? Does the law suffice to protect humanity?

At the discussion evening in the function room at the Leopoldina’s Berlin office the venue was packed and the debate heated. Several members of the German Bundestag discussed the subject with the scientists, who made the relevance of the topic clear by bringing in case studies.

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Dear members

and friends of the Leopoldina,

One of the Academies’ key tasks is to advise politicians and society on urgent topics, some of which are the subject of intense



debate, from a scientific point of view. The statement “Predictive Genetic Diagnostics as an Instrument of Disease Prevention” shows how seriously we take this task. The

paper, elaborated by 17 renowned scientists led by Prof. Peter Propping ML, makes a very wide range of statements on one such topic. Jointly signed by the Leopoldina, acatech and the Berlin-Brandenburg Academy of Sciences and Humanities (for the Union of the German Academies of Sciences and Humanities), it provides recommendations in the context of the new individualised nature of medicine and considering the ethical aspects of the topic. Not only this, but the statement also highlights changes needing to be made in German law on genetic diagnostics. Read more on the subject in this issue of the newsletter, which will also be reporting on numerous other activities. One example is the ceremonial laying of the foundation stone for the future main building of the Leopoldina in Halle, to which we had the pleasure of welcoming the Federal Minister for Education and Research, Prof. Annette Schavan.

Best regards,

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News

“The Leopoldina will become the arbitrating authority”

The laying of the foundation stone for the future main building of the Academy took place on 9 November in Halle – Federal Minister of Education and Research Annette Schavan paid tribute to the role of the National Academy

The schedule for the completion of the Leopoldina's new building is ambitious. The funds from the second federal economic stimulus package must have been invested in the building by the end of 2011. Despite this pressure, everything is going according to plan: on 9 November the foundation stone was laid. The ceremony in Halle was attended by the Federal Minister for Education and Research, Annette Schavan, the Minister of Education and the Arts for the State of Saxony Anhalt, Birgitta Wolff, and (representing the Parliamentary State Secretary Jan Mücke) the departmental head at the Federal Ministry of Transport, Building and Urban Development, Günther Hoffmann.

The capsule for the foundation stone was well filled: The Leopoldina's President Prof. Jörg Hacker ML placed numerous Academy publications in the copper cylinder, along with the building's planning documents and copies of that day's newspapers. In his speech beforehand Jörg Hacker said: “For the Academy, its new headquarters will develop into a central place of dialogue, where science, politics and society meet.” Federal Minister Prof. Annette Schavan drew attention to the Academy's special role: “I am convinced that the Leopoldina will become the German authority when it comes to dialogue between politics and science; dialogue among the elite members of our



Laying of the foundation stone for the new main building: Federal Minister Annette Schavan, State Minister of Education and the Arts Birgitta Wolff, the Leopoldina President Jörg Hacker, construction manager Wolfgang Weimer, the Leopoldina's Secretary General Jutta Schnitzer-Ungefug and Günther Hoffmann, departmental head at the federal ministry for construction (from left to right)

Photograph: David Ausserhofer

society about what is required to build us a future.” Prof. Birgitta Wolff, Minister of Education and the Arts for the State of Saxony Anhalt, called the future headquarters a “temple of scientific discourse”. The departmental head at the federal ministry for construction, Günther Hoffmann, and the Leopoldina's Secretary General, Prof. Jutta Schnitzer-Ungefug, recalled the

obstacles the project had once come up against. Some factors in this success story include the second federal economic stimulus package, which provided 15.2 million euros for restoration, funding of roughly one million euros from Saxony Anhalt, which made it possible to purchase the property, and, last but not least, passionate local commitment in Halle. (mab)



The plan shows the upper floor with the function hall and lecture hall, as well as the room for Presidium sessions.

Image: RKW



The President of the Leopoldina, Jörg Hacker, thanked his predecessor Volker ter Meulen (from left to right) for his strong commitment to the Academy. The Leopoldina honoured its former President with the Academy's highest tribute – the honorary membership.

Photograph: Ilja C. Hendel

Honorary membership for Volker ter Meulen

The Leopoldina's former President received the Academy's highest tribute at a symposium held in his honour

The former President was given honorary membership on the occasion of the honorary symposium "New developments in infectious diseases", held as a tribute to Prof. Volker ter Meulen ML in the assembly hall of the "Löwengebäude", the main building of the University of Halle, on 27 October. He received the highest tribute paid by the Leopoldina from the hands of his successor in office, Prof. Jörg Hacker ML, who emphasized Prof. ter Meulen's strong commitment to the Academy: "By awarding him honorary membership, the Leopoldina is paying tribute to Volker ter Meulen as one of its great Presidents."

Prof. Hacker went on: "In awarding this honorary membership the Leopoldina would like to thank Volker ter Meulen for his hard work, especially in paving the way for our being named German National Academy of Sciences." Prof. ter Meulen, a renowned virologist and medical expert, was President of the Leopoldina from 2003 to the spring of 2010. Under his leadership, in 2008 the Academy was named German National Academy of Sciences by the Joint Science Conference

(GWK) on the initiative of the Federal Minister for Education and Research, Prof. Annette Schavan.

Under Prof. ter Meulen's leadership the Leopoldina's work on international boards was intensified and its transformation into a working academy was strengthened, allowing increasing numbers of independent scientific expert reports to be developed on socially relevant topics, aimed at politics and the public. These activities, in turn, played a crucial part in the Leopoldina being named German National Academy. The permanent secretary at the Federal Minister of Education and Research, Dr Georg Schütte, was invited to bestow the honorary membership at the event, and addressed the following words to Prof. ter Meulen in his speech: "You recognized the challenge of making the Leopoldina part of an international network and you took the steps required."

In his speech of thanks Volker ter Meulen spoke about his time in office, its challenges and his successes. He also gave a very personal summary: "It was wonderful. I have extremely precious memories of the time." (mab, ndf)

Policy consultancy: seven steering panels are formed

The Leopoldina is consolidating its expertise in consultancy on socially relevant scientific topics. To do so it has formed steering panels of renowned scientists. The groups are tasked with defining future issues and initiating policy consultancy activities. These may be ad-hoc opinion statements on extremely urgent questions or long-term recommendations developed by specially formed working groups. Steering panels have been formed for the following areas:

- "Health", spokespeople: Prof. Volker ter Meulen ML, former President of the Leopoldina, and Prof. Detlev Ganten ML, President of the World Health Summit

- "Aging and Fertility", spokespeople: Prof. Wolfgang Holzgreve ML, Berlin Institute for Advanced Study, and Prof. Ursula M. Staudinger ML, Vice-President of Jacobs University Bremen and Vice-President of the Leopoldina

- "Science Report", spokespeople: Prof. Gunnar Berg ML, Vice-President of the Leopoldina, and Prof. Martin J. Lohse ML, Institute of Pharmacology at the University of Würzburg and Vice-President of the Leopoldina

- "Acceptance of Science", spokespeople: Prof. Martin J. Lohse ML, Institute of Pharmacology at the University of Würzburg, Vice-President of the Leopoldina, and Prof. Ursula M. Staudinger ML, Vice-President of Jacobs University Bremen and Vice-President of the Leopoldina

- "Life Sciences", spokespeople: Prof. Bärbel Friedrich ML, Institute of Biology at the Humboldt University in Berlin and Vice-President of the Leopoldina, and Prof. Jörg Hacker ML, President of the Leopoldina

- "Climate, Energy and the Environment", spokespeople: Prof. Herbert Gleiter ML, KIT Karlsruhe, Prof. Hans Joachim Schellnhuber ML, PIK Potsdam, and Prof. Ferdi Schüth ML, Max Planck Institute for Coal Research, Mülheim

- "Science Ethics", spokespeople: Prof. Philipp U. Heitz ML, Pathological Institute at the University of Zurich, and Prof. Hans-Peter Zenner ML, Chair in Otolaryngology at the University of Tübingen (mab)

Biennial Conference Erlangen

Senate elects two Vice-Presidents and other members of the Leopoldina Presidium

In its session of 29 September, in the lead-up to the biennial conference, the Leopoldina senate confirmed that Prof. Bärbel Friedrich ML would start her second period in office as Vice-President, and appointed Prof. Gunnar Berg ML as a new Vice-President. He succeeds the biochemist Prof. Gunter S. Fischer ML, who was not eligible for re-election according to the statutes, having spent two five-year periods in office. The senate also elected three new secretaries, who are responsible for the classes, and other Presidium members.

Bärbel Friedrich ML, professor of microbiology at the Humboldt University in Berlin, has been Vice-President of the Leopoldina since 2005 and a member of the Academy's Microbiology and Immunology section since 1994.

Gunnar Berg ML, professor emeritus of experimental physics at Halle University. From the year 2000 on he was the secretary responsible for Class I, to which the sections of Mathematics, Natural Sciences

and Engineering belong. Prof. Berg has been a member of the Academy since 1999; this is the first time he has acted as Vice-President.

Herbert Gleiter ML, professor emeritus of applied physics and a scientific member of the KIT Institute of Nanotechnology, will be taking on the office of secretary for Class I. Prof. Gleiter has been a member of the Physics section since 1998 and a member of the Presidium since 2007.

Peter Propping ML, director emeritus of the Institute of Human Genetics at the University of Bonn, will be taking on the duties of secretary for Class II, representing the biosciences sections. Prof. Propping has been a member of the section for human genetics and molecular medicine since 2001 and the representative for the section since 2008.

Frank Rösler ML, senior professor of Cognitive Psychology at the University of Potsdam, will be taking on Class IV as secretary for the first time. This class inclu-

des the sections for the Science of History, Cultural Studies, Behavioural Science and the Social Sciences. Prof. Rösler has been a member of the Psychology and Cognitive Science section since 2001, and its representative since 2002.

Hans-Peter Zenner ML, professor and director of the ENT department at Tübingen university hospital, has been newly elected to the Presidium. Prof. Zenner has been a member of the section for Ophthalmology, Otolaryngology and Stomatology since 1998 and the representative for the Otolaryngology subsection since 2006.

Helmut Schwarz ML, professor of organic chemistry at Technische Universität Berlin and President of the Alexander von Humboldt Foundation, was also elected to the Leopoldina Presidium for the first time. Prof. Schwarz has been a member of the Chemistry section since 1992 and was the representative for the Organic Chemistry subsection from 1996 to 2002.

Christian Kubisch receives the Leopoldina Early Career Award

On 29 September Prof. Christian Kubisch (photo), professor of human genetics, was awarded the €30,000 Leopoldina Early Career Award, sponsored by the Commerzbank Foundation. It was the first time that the award was presented in this form at the biennial conference in Erlangen. Christian Kubisch was presented with the Award for his outstanding work explaining the causes of and dysfunctions involved in various genetic diseases.

Prof. Kubisch (born 1967) is the director of the Institute for Human Genetics at the University of Ulm. He played a crucial part, for example, in the discovery of the genes responsible for forms of Parkinson's disease, epilepsy and various hearing defects. One focus of his work is investigating the genetic causes of mi-



graine. The Early Career Award, sponsored by the Commerzbank Foundation, is now to be presented every two years. Previously, the foundation was involved in the Leopoldina's research prize. This €15,000 award is to be replaced by the Early Career Award. (mab)

Election regulations amended

At the Leopoldina Presidium session in Erlangen, a resolution was passed amending Paragraph 6 of the election regulations. The key change is the appointment of a selection committee when electing the President or Vice-Presidents of the Academy.

In future, this committee will include the four spokespersons for the Leopoldina classes, the two Presidium members from Austria and Switzerland (or two other Leopoldina members). When the President is elected they will be joined by an additional three ex-officio Presidium members. (jb)

• The complete text of the election regulations can be found under "Academy": www.leopoldina.org

Genetics and Neurobiology of Mental Retardation

International conference in Erlangen brings geneticists and neurobiologists together to discuss genetic bases and neurobiological processes / By Prof. André Reis ML

Genetic changes are the main cause of mental retardation (MR) in developed countries. The underlying genetic defects, however, largely remain unknown. At the same time, neurobiology has been intensively examining the structures and processes of nerve development in general, and synaptic transmission in particular. The international conference "Genetics and Neurobiology of Mental Retardation", which also served as the Leopoldina's biennial conference, aimed to combine both scientific fields.

More than 200 participants from eleven European countries, the US and Canada participated in the event from September 29 to October 1 in Erlangen. Sixteen leading international researchers and numerous young researchers discussed the latest findings. The conference was supported by the Leopoldina, the Federal Ministry of Education and Research (BMBF), the Interdisciplinary Center for Clinical Research (IZKF) Erlangen and industrial sponsors.

Mental retardation, or MR, is defined as a substantial reduction in cognitive and social abilities manifesting in childhood. Connected to this is the permanent limited ability to understand new or complex information, a diminished ability to learn and a decrease in independence. MR is often associated with other diseases such as epilepsy, autism and attention deficit hyperactivity disorder (ADHD). MR is found in two to three percent of the population and is thus one of the most frequently occurring diseases.

Even today, no cause can be determined in more than half of the cases; however, genetic factors such as chromosomal defects and single gene defects play a key role. Research into the underlying molecular mechanisms is thus not only vital for diagnosis and treatment of the individuals affected, it can also open up new prospects for future therapeutic interventions. In this context, the "German Mental Retardation Network (MRNET)", funded by the BMBF and headed by the human geneticist Prof. André Reis ML

from Erlangen, has been working on a systematic investigation into the genetic causes of mental disability since 2008.

During the conference, scientists from Germany, Europe, the US and Canada gave presentations on recently discovered genetic defects and copy number alterations of individual segments of the genome that are believed to be causes of mental disability. André Reis (Erlangen) reported that in Europe, the majority of those affected have healthy parents and no siblings with the disease. Newly occurring gene mutations are often the cause in these sporadic cases. Thus mental disability is genetically-based; however, the parents are not at a higher risk of the disability appearing in their other children. X chromosome forms of MR are often visible in family trees and therefore systematic research has been carried out on these cases for some time.

Prof. H. Hilger Ropers (Berlin) reported that meanwhile, mutations in nearly 100 X chromosome genes have been elucidated. Nearly all of the processes in nerve development and function are affected. Dr Laurence Colleaux (Paris) and Dr Andreas W. Kuss (Berlin) each reported about studies on recessive forms of MR by means of positional cloning and autozygosity mapping in families with blood-related parents. Prof. Nigel Carter (Cambridge, UK) spoke on the effects copy number alterations of entire segments of the genome (copy number variants) with dosage-sensitive genes had on mental development. He also reported on a study underway which is searching for mutations by means of sequencing the entire coding segment of the genome in 1,000 affected people.

The elucidation of molecular structures and signaling pathways in cell-biology is increasingly allowing forms of MR with elucidated genetic defects to be grouped according to the function that is affected. This was made particularly clear in the presentation given by Prof. Eric Legius (Leuven, Belgium) on the various diseases that are associated with mutations

in the Ras signaling pathway, as well as in the presentation given by Prof. Linda van Aelst (Cold Spring Harbor, USA) on Rho-GTPases. In both cases, mutations in interacting molecules lead to overlapping clinical phenotypes according to disease families. Disturbances in the neural migration result in corresponding defects depending on the affected stage of development with characteristic morphological and functional defects (Prof. Jamel Chelly, Paris, France). The signal pathways were decoded particularly well in fruit flies (*D. melanogaster*). Dr Annette Schenck (Nijmegen, Netherlands) is investigating the homologues of the gene associated with MR in fruit flies for interaction with other gene products in order to find molecular networks and ultimately a basis for drug therapies.

Prof. Daniel Geschwind (Los Angeles, USA) gave a presentation on the neurobiology of autism and Prof. Danielle Posthuma (Amsterdam, Netherlands) on the genetic basis for human intelligence. One highlight was the presentation by Prof. Stephen T. Warren (Atlanta, USA) on the latest results of a drug therapy for patients with fragile x syndrome, the second most frequent cause of MR. The elucidation of the pathogenesis had shown an over-excitation of glutamatergic neurons as a result of a missing FMR protein. Building on this, clinical studies are currently being carried out on various inhibiting substances which have demonstrated an improvement in cognitive abilities and behavior in animal trials.

The conference has demonstrated how combining clinical genetics, genomics and neurobiology results in a mutual enrichment of research and can lead to a better understanding of the genetic causes and the decoding of the pathogenesis of MR. The findings will contribute to improving the diagnosis, prognosis and counseling of affected individuals and their families. The fragile x syndrome findings lend hope that drug treatment for some of those affected will soon be possible.

“We are entering the Age of Genetic Medicine”

Statement makes clear the impact of technological advancement on society

A scientific evaluation of genetic diagnostics is immensely important for society. “We are entering the age of genetic medicine,” explained Prof. Peter Propping ML, Head of the Academy’s group “Predictive Genetic Diagnostics as an Instrument of Disease Prevention” at the presentation of the statement of the Leopoldina, acatech and the Berlin Brandenburg Academy of Sciences and Humanities (for the Union of German Academies of Sciences and Humanities). The human geneticist and his colleague Prof. Claus R. Bartram ML (Heidelberg), along with medical ethicist Prof. Urban Wiesing (Tübingen), presented examples of the effects that technological advancement in genetic diagnostics has on the development of medicine and, consequently, on humans.

The focus of the public analysis in Berlin was the law on genetic diagnostics, which the paper recommends amending. The scientists’ statements revealed the shortcomings of the law passed in February 2010. An important example is the screening of newborns, which the law considers to be a genetic survey. The result is that parents have to be advised by a doctor before blood is taken from the child’s heel. Since the law was passed, more and more evidence is showing that the screening is not being carried out after home births, even though this is not what the parents wish. The scientists thus recommend the law be amended so that midwives are also allowed to advise.

An overview of the recommendations:

Recommendation 1: Predictive genetic diagnostics must only be carried out at the request of and in the interests of individual people.

Recommendation 2: The Academy Group expressively rejects eugenic ideas, such as the aim of wanting to eliminate certain genes from all individual genomes of a population or wanting to systematically „improve“ the human gene pool.

Recommendations 3-5: If during genetic diagnostics more information – „excess information“ – is generated than is required for the intended diagnostics,

the Academy Group recommends discussion with the affected person concerning proceedings to bring about an „enlightened decision“. An excess of genetic information should not appear in the medical file or any doctor’s letters.

Recommendation 6: The genetic analysis of a sample acquired abroad by a German laboratory should be acceptable if the doctor that has sent the sample confirms that the person concerned has been provided with information about the nature, scope and significance of the genetic examination in accordance with the legal regulations in the sample’s country of origin and the person concerned has subsequently granted his consent.

Recommendations 7 and 8: The newborn screening is a successful example of the use of early recognition of an illness using predictive genetic diagnostics. Surveys for other genetic illnesses should be aligned with the newborn screening. In the Gendiagnostikgesetz, newborn screening should however be regulated separately and under consideration of the particular examination situation.

Recommendations 9 and 10: A range of genetically determined and essentially treatable diseases which are highly likely to appear over a lifetime can be predicted. In the health system, organisational measures should be taken to treat patients with these kinds of diseases and persons at risk in an appropriate way. Here the further training of specialist doctors and the setting up of interdisciplinary and superregional competence centres can also play a role.

Recommendation 11: The Academy Group encourages research projects to identify the prerequisites and criteria which must be fulfilled in Germany for offering genetic screening.

Recommendation 12: The systematic investigation of healthy people for dispositions (heterozygote screening for recessive diseases) – without any family history of disease being evident – is a new situation for our society which has wide-ranging ethical and social implications. Such investigations should for the time being only be carried out within the scope of research projects.

Recommendation 13: Before predicti-

ve genetic diagnostics can be integrated into the health system, supporting evidence indicating their effectiveness and cost-effectiveness must be available. For this, scientific accompanying projects are necessary.

Recommendation 16: The Gendiagnostikgesetz stipulates that the responsible doctor is to destroy the results of genetic investigations and analyses ten years after the investigation. The Academy Group recommends: the results of the genetic diagnostics should be allowed to be stored in the interest of counselees and family members without a concrete deadline as before.

Recommendations 17 and 18: The complete sequencing of the genome can provide evidence for explaining genetic contributions to multifactorial diseases. The Academy Group recommends intensively setting up appropriate, systematic research programmes in Germany and promoting translational research and the development of medical guidelines for predictive genetic diagnostics as well as basic research.

Recommendations 19 and 20: Genetic tests, as currently offered directly via the internet – so-called DTC tests (“direct to consumer” tests) – mostly have an uncertain scientific basis and do not generally fulfil the requirements of a suitable genetic consultation. DTC tests should not be permitted because they do not fulfil the requirements of medical and ethically acceptable predictive genetic diagnostics.

Recommendations 21 and 22: Society should be informed properly and continually about the possibilities and limits of genetic medicine, including predictive genetic diagnostics. The new findings of genetic research should be presented in schools, in particular. The Academy Group recommends providing doctors with further training in genetic medicine using special measures. They must be in the position to recognise high-risk people for treatable hereditary illnesses and refer them to specialists for consultation, diagnostics and care. (mab)

► For the full statement go to:
www.leopoldina.org

International Issues

Leopoldina participates in the STS Forum in Kyoto

Research, innovation and ethical questions were the focus of the international meeting in Japan / By Prof. Jörg Hacker ML

The Science and Technology in Society (STS) Forum once again took place in Kyoto, Japan from 3-5 October. The event, which is also known as the “Davos of Science”, was held for the eighth time. Scientists, business leaders and politicians traditionally meet in Kyoto to discuss topics in the areas of research, innovation and ethics of science funding. Around 1,000 participants took part this year.

FORUM ON AGING

The Leopoldina took part in various events at this year’s STS Forum. Prof. Ursula M. Staudinger ML held a forum on aging at which the problems of an aging society were discussed together with representatives from the German Academy of Science and Engineering acatech. This year, a meeting of the presidents of the national academies was

arranged by the event organizers for the first time. Leopoldina’s president Prof. Jörg Hacker ML participated in the meeting which dealt with various formats of political consulting. The Leopoldina was also present at the symposium on infectious diseases.

A STATEMENT OF THE RESULTS

The results of the meeting in Kyoto will be circulated through statements. The “Davos of Science” was once again an extremely stimulating and valuable event. The organizers announced that the STS Forum will continue to take place in Kyoto in the coming years.

► Further information and the forum’s concluding statement can be found at: www.stsforum.org

Leopoldina President speaks with France’s Académie des Sciences

In July, Leopoldina’s president Jörg Hacker ML visited the Académie des sciences in Paris and carried out talks with the French national academy’s president Jean Salençon, vice president Alain Carpentier and secretary general Lysiane Huvé-Teixier. The purpose was to look into the academies’ mutual scientific interests and explore possibilities for cooperation.

France’s national academy is in charge of developing recommendations by the G8 academies of science in the run up to the summit of G8 country leaders in 2011. A meeting of the national academies will take place in Paris in the spring. The academies make scientifically-based recommendations every year on the summit’s topics, which are then incorporated into the talks. For this year’s G8 Summit in Canada, statements were developed on “Health of Women and Children” and “Innovation for Development”.

Seminar Series in German-Brazilian Year of Science

Scientists discuss global challenges in Rio de Janeiro and Sao Paulo

The Leopoldina organized a series of seminars together with the Brazilian Academy of Sciences as part of the German-Brazilian Year of Science, Technology and Innovation 2010/11. The seminars took place in Rio de Janeiro and Sao Paulo from 16-19 November and were devoted to the topics “Simulations”, “Biosphere Physics”, “New Materials”, “Gerontology and Chronic Degenerative Diseases” and “Science for Society”. High-ranking German and Brazilian scientists took part in these one-day seminars.

The aim of this series of seminars was to strengthen the exchange between Germany and Brazil on scientific topics and to find a starting point for further joint initiatives. “From our side, these seminars are an excellent opportunity to exchange information about which research structures and scientific initiatives exist in both our countries and, above all, which topics will form the basis for future political and social statements,” says the coordinator of the seminar series appointed by the Leopoldina, Prof. Detlev Gan-

ten ML, president of the World Health Summit. Both countries jointly took up global challenges such as climate change. They also discussed solution strategies and how to implement these with the aid of new technologies.

One of the purposes of the Federal Ministry of Education and Research’s “Year of Science” is to give new impetus to scientific and technological cooperation.

Conference Reports

Molecular-biological characterisation of microbes

Joint meeting of Leopoldina and Robert Koch Institute focused on the latest research findings for pathogen typing / By Prof. Wolfgang Witte (Robert Koch Institute)

The 9th International Meeting on Microbial Epidemiological Markers (IMMEM-9) was held jointly by the Leopoldina and the Robert Koch Institute in Wernigerode (Harz) from 1 to 4 September 2010. With "From genomics to tracing pathogens" as its designated focus, the meeting centred on the application of new insights from the field of structural and functional genomics of microbial pathogens for the development of methods of typing and characterising pathogen strains. The meeting was attended by 160 participants from 30 countries. Traditionally held under the auspices of the European Society for Clinical Microbiology and Infectious Diseases, the meeting was sponsored by the German Society for Hygiene and Microbiology, the Paul Ehrlich Society for Chemotherapy and the Alfred Krupp von Bohlen und Halbach Foundation.

Typing strains of pathogens using epidemiological markers is crucial for establishing surveillance systems to detect the emergence and diffusion of pathogen strains early on and for developing targeted approaches to preventing them from spreading (tracing routes of infection). Researchers are currently focusing particularly on causative agents of hospital infections showing multiple drug resistance and zoonotic pathogens. The establishment and use of typing systems for epidemiological analysis of the spread of pathogen strains has been coordinated at the international level from the very outset so as to achieve comparable results for different countries, thus allowing early warning systems to be set up and efforts to be coordinated internationally. The International Meeting on Microbial Epidemiological Markers (IMMEM) was launched on the initiative of the Euro-

pean Society for Clinical Microbiology and Infectious Diseases in 1967, when most methods of typing bacteria were still based on phenotypic characteristics. The number of participants attending the meeting has grown steadily over the past 20 years.

What genome analyses tell scientists about microevolution has indirect implications for treatment and prevention. Pulmonary tuberculosis is still one of the leading infectious causes of death worldwide. The association between the genomic background and the development of multiple drug resistance in certain clonal lineages (subpopulations) of *Mycobacterium tuberculosis* gives cause for concern that highly-resistant "hyper-virulent" strains might emerge. One example is the so-called Beijing strain (Prof. S. Niemann, Research Center Borstel). In the case of *Staphylococcus aureus*, the most common cause of hospital infections, an increase in the incidence of isolates exhibiting resistance to methicillin and other classes of antibiotics (MRSA) is associated with the evolution of subpopulations that have the potential to spread all over the globe, so-called epidemic strains. (Dr. M. Holden, Sanger Centre, Cambridge/UK; U. Nübel, Robert Koch Institute).

Defining molecular markers that facilitate rapid detection of epidemic strains is key to preventing such strains from spreading. Using the example of MRSA, Prof. A. Friedrich of the University of Groningen/the Netherlands reported on how this task is being tackled within a European network, the SeqNet initiative. As Dr. Ammon of the European Centre for Disease Prevention and Control (ECDC) in Stockholm/Sweden illustrated in her paper, expanding and consolidating such networks for typing MRSA and other microbial pathogens is an impor-

tant instrument of the ECDC's surveillance programmes.

Thus a network based on Multiple Loci VNTR Analysis is currently being established for one of the most common bacterial causes of diarrhoea, enteritis salmonella (Dr H. Lindstedt, Norwegian Institute of Public Health, Oslo/Norway). The network is enhanced by genome sequencing (Dr J. Wain, Health Protection Agency, London/UK).

Genome-based typing methods in advanced clinical microbiological diagnostics provide crucial data on the virulence of pathogen strains with respect to various disease patterns. Distinguishing pathovars of normally harmless commensal organisms is of particular importance in this regard. Prof. H. Karch and Prof. U. Dobrindt of the University of Münster discussed this using the example of gastrointestinal and systemic infections caused by *Escherichia coli*, a bacterium of the intestinal flora.

Genome analyses also shed light on the mechanisms with which zoonotic pathogens adapt to their hosts. Raising livestock for meat and milk in an industrial setting constantly poses new challenges for infection management. In his paper, Prof. P. Glaser presented data on *Streptococcus agalactiae*, which can cause infection in humans, cattle and even fish. Prof. J. Wagenaar of Utrecht University spoke about the importance of molecular markers in tracing the spread of zoonotic MRSA (livestock-associated MRSA) and assessing the risks it presents.

Renewed interest in plasmid biology has contributed significantly to our understanding of how resistance to antibiotics develops. There have been an increasing number of reports on the appearance of strains of gram-negative pathogens exhibiting multiple drug resis-

tance that leave very few options for treatment. Plasmids with a modular structure and a broad host range play an important role in this respect. With a view to this, Prof. Carattoli of the National Institute of Health in Rome/Italy offered a catalogue of methods for the epidemiological analysis of plasmids. Dr Laverde-Gomez of the Robert Koch Institute in Wernigerode gave a presentation on enterococci to

demonstrate that plasmids can also contain genomic islands harbouring genes associated with virulence and metabolic genes in addition to antibiotic resistance genes.

Suitable bioinformatic methods are the prerequisite for the practical application of data from genomics to develop high-throughput typing methods. An interactive workshop on this topic served

as a fitting conclusion to the meeting and provided an outlook on future requirements.

► The main papers presented at the meeting will be published in a special volume of the International Journal of Medical Microbiology.

A unified theory of everything

International conference on Quantum Field Theory and Gravity in Regensburg / By Prof. Eberhard Zeidler ML

Physicists and mathematicians gathered at the Quantum Field Theory and Gravity conference in Regensburg from 28 September to 2 October 2010 to discuss advances in the search for a unified framework to explain the fundamental forces of nature.

Two great theories revolutionised physics in the 20th century: Einstein's general theory of relativity, which describes gravitation, and quantum theory, which describes the behaviour of atoms, molecules and elementary particles. While the general theory of relativity is concerned with the vast distances in space, quantum theory deals with the behaviour and interaction of energy and matter at the atomic and subatomic level. Scientists have been struggling for about 80 years to find a way to combine both theories into a unified theory that would describe all physical phenomena.

Many physicists assume that the structure of space and time changes significantly below a certain, very small scale (the Planck scale). The Regensburg conference aimed to give a broad overview of the wide variety of methods physicists and mathematicians are using to develop a unified theory. In addition to 22 papers presented by physicists and mathematicians from Germany, the UK, the Netherlands, Italy, Mexico, Poland, Spain and the US, the conference included two discussion rounds. One of the main focuses was theoretical approaches to quantum gravity (the quantisation of space and time).

The conference series was initiated by Jürgen Tolksdorf in 2003. There

have been four conferences so far – 2003 and 2005 (Blaubeuren near Ulm), 2007 (Leipzig), 2010 (Regensburg) – and the number of participants has increased steadily. The conference's stated aim is to bring together physicists and mathematicians working in quantum field theory and general relativity (every two or three years) and to encourage scientific discussions on fundamental and conceptual issues. The conference is especially open to young researchers on the graduate and post-graduate level.

Major breakthroughs in the history of physics have invariably been achieved through the interplay of new experimental findings and bold theoretical approaches. Thus the problem of a unified theory of nature will not be solved by studying theoretical models alone. Experiments will be needed to narrow down the mathematical possibilities (e.g. fundamental symmetries). The essential difficulty is that such experiments must be performed at extremely high energies. Physicists hope that new insights will come from experiments currently being conducted with the CERN particle accelerator (LHC, Large Hadron Collider), the Planck satellite (to measure cosmic background radiation, the "afterglow" of the Big Bang) and laser interference experiments that aim to provide evidence for gravitational waves. They will provide an idea about which of the theoretical approaches devised so far are truly promising and which need to be abandoned – or whether completely new ones are needed. Whatever the case may be, the existing theoretical groundwork is sure

to be useful.

The conference was jointly hosted by the University of Regensburg and the National Academy of Sciences Leopoldina and was attended by around 100 physicists and mathematicians. It was made possible by financial support from the Hans Vielberth Foundation, the University of Regensburg's Johannes Kepler Research Center for Mathematics, the Leopoldina, the Alfred Krupp von Bohlen und Halbach Foundation, the German Research Foundation (DFG), the Max Planck Society, and the International Association of Mathematical Physics. It was organised by Prof. Felix Finster, Dr Jürgen Tolksdorf, Dr Olaf Müller, Dr Marc Nardmann (all at Regensburg) and Leopoldina member Prof. Eberhard Zeidler (Leipzig).

► Two volumes of conference proceedings have been published so far: B. Fauser, J. Tolksdorf, E. Zeidler (eds.), *Quantum Gravitation: Mathematical Models and Experimental Bounds*, Birkhäuser, 2006; and *Quantum Field Theory – Competitive Methods*, Birkhäuser, 2008. A third volume will be dedicated to the Regensburg conference.

► For more details, please go to: <http://www.uni-regensburg.de/qft2010/>

Human rights in science

Participants in the Leopoldina symposium in Berlin discussed the significance of human rights for the freedom of science, and violations of human rights / By Prof. Johannes Eckert ML

On 6 and 7 October 2010 the Leopoldina held a symposium in Berlin on the topic of "Human Rights and Science", involving members of academies and universities from twelve European countries.

The International Human Rights Network of Academies and Scholarly Societies (IHRN) in Washington, of which the Leopoldina is also a member, was represented by its director Carol Corillon. As an introduction, Markus Löning, Federal Government Commissioner for Human Rights and Humanitarian Aid, reported on his department's activities and Prof. Beate Rudolf, director of the German Institute for Human Rights in Berlin, described this important institute's varied tasks and projects.

The key focuses of the conference were lectures on research freedom, responsibility and borders from the point of view of human rights (Prof. Rüdiger Wolfrum, Heidelberg), the role of human rights in research on human beings, e.g. in drugs testing or stem cell research (Prof. Elmar Doppelfeld, Cologne), and human rights aspects during cooperation with developing countries (Folke Kayser, Eschborn) and during international cooperative research (Prof. Jean-Paul Lehnert, Luxembourg).

As Folke Kayser reported, the GTZ (German Society for Technical Cooperation) has been working for some years now according to a new concept known as the "Human Rights-Based Approach". The aim of this approach is to use development aid not only to boost economic development, but also, at the same time, to improve the human rights situation. Thus, for example, when new water sources are being developed, care is taken to ensure that minorities in the population are not disadvantaged when it comes to the water distribution. Prof. Jean-Paul Lehnert called for a similar approach in international scientific cooperation.

It is not enough to condemn human rights violations. Instead, human rights

norms should be taken into account as an inescapable basis when planning and running any research project. By developing international networks taking into account human rights norms and by promoting education, science can significantly help social progress. Academies, universities and other research institutes should include the promotion of human rights among their goals as a matter of principle. As set out in the UNESCO's Venice Statement on the Right to Enjoy the Benefits of Scientific Progress and its Applications, the scientific community, organisations and states are under obligation to ensure that scientific knowledge is shared and used globally, without discrimination, to help society develop.

Although the UN's 1948 Universal Declaration of Human Rights and the international and national legal norms created afterwards (lecture by Prof. Christian Tomuschat, Berlin) represent considerable progress, the human rights situation is uncertain in many countries. This could be seen from a paper presented by Prof. Manfred Nowak, Vienna: the UN Special Rapporteur on Torture provided a comprehensive insight into this issue. Another indication of the dissatisfactory situation is the fact that the European Court of Human Rights in Strasbourg deals with up to 35,000 complaints a year, with some 138,000 pending cases now having accumulated at the court.

Around the world, people from academia are also affected by human rights violations. The IHRN, which includes some 70 academies, works on behalf of people who are subject to repression by the state as a result of the non-violent pursuit of human rights. During the conference, information was shared about cases of this kind.

The conference attendees agreed that cooperation regarding human rights issues between the European academies and the IHRN could be improved upon, and required new momentum.

Hans-Peter Zenner becomes new Chairman of the Human Rights Committee

Since 5 October Prof. Hans-Peter Zenner ML, professor and director of the



ENT department at Tübingen university hospital (photo) has been the Chairman of the Leopoldina Human Rights Committee

(HRC). Zenner has been an Academy member since 1998 and a member of the Leopoldina Presidium since September 2010. He replaces the previous Chairman Prof. Johannes Eckert ML, Zurich, who was one of the founding members of the HRC in 2001 and who will continue to work on the committee. Since 2003 the HRC has been part of the "International Human Rights Network of Academies and Scholarly Societies" (IHRN). The IHRN was founded in 1993 at the US National Academy of Sciences in Washington, D.C. It supports scientists from around the world suffering from repression as a result of having non-violently pursued their rights, as laid out in the Universal Declaration of Human Rights. The IHRN currently includes academies and scholarly organisations from 70 countries. (mab)

Events

LEOPOLDINA-LECTURE ON THE OCCASION OF THE AWARDING OF THE MEDAL OF MERIT TO PROF. ERNST LUDWIG WINNACKER ML: „WISSENSCHAFT OHNE NATIONALE GRENZEN – EINE EUROPÄISCHE HERAUSFORDERUNG“ („SCIENCE WITHOUT NATIONAL BORDERS - A EUROPEAN CHALLENGE“), TUESDAY, 14 DECEMBER, 4.30 P.M., ASSEMBLY HALL OF THE „LÖWENGEBAUDE“, MAIN BUILDING OF THE MARTIN-LUTHER-UNIVERSITY HALLE-WITTENBERG, UNIVERSITÄTSPLATZ, 06108 HALLE

In this lecture Prof. Ernst-Ludwig Winnacker ML will be analysing the paradox that on the one hand science is international, but on the other its organisations (universities, research funding bodies or academies) are generally nationally structured, or even only locally. This usually makes cross-border cooperation difficult, which has long been a disadvantage to Europe.

The founding of the European Research Council (ERC) has made a fundamental difference to the situation, as this body spurs on inter-institutional competition. Most of this presentation will be taken up by an initial analysis of the work of the ERC, and above all a closer examination of the resulting inferences for the attractiveness of research in Germany and Europe.

At this event Ernst-Ludwig Winnacker will be receiving the Leopoldina's Medal of Merit, honouring the former Vice-President (1995–2005) for his services related to developing the Academy in the time after German reunification.

Cornelia Pieper MdB, Minister of State at the Foreign Ministry, will be making a welcome speech.

INTERNATIONAL WORKSHOP: „MEDICINE AS A MEDIUM OF MULTIPLE MODERNITIES - TRANSACTIONS AND CONTINGENCIES BETWEEN CHINA, GERMANY AND JAPAN IN THE 19TH AND EARLY 20TH CENTURIES“, 10 - 12 MARCH 2011, 9 A.M., ASSEMBLY HALL OF THE „LÖWENGEBAUDE“, MAIN BUILDING OF THE MARTIN-LUTHER-UNIVERSITY HALLE-WITTENBERG, UNIVERSITÄTSPLATZ, 06108 HALLE

Medicine focuses on the most recent scientific findings and techniques while at the same time it is a practice deeply interwoven in the everyday life of people. Thus medicine can serve as a medium that mirrors on one hand, complex scientific, technical as well as economic processes and on the other hand, adaptation to these social processes in the everyday lives of people. From the perspective of globalization, it is the aim of this project to explore and create knowledge to understand current issues of globalization by examining processes of modernization through the focus of medicine.

This specific approach promises valuable insights when processes of globalization and modernization are examined in different countries, regions, institutions or disciplines. For the purpose of comparison, the regions of Europe and East Asia will be selected. However, histori-

cal comparison is not the research goal in itself but only a heuristic instrument. Germany, Japan and China will be at the centre of attention because modernization in these three countries occurred in different periods while being in a key relationship of interdependence when transferring modern medicine from Europe to East Asia and within Asia. With the selection of these two regions and three countries, the diverse exchange and transaction of ideas between Europe and Asia in different areas of knowledge and activity will be the focus of investigations. In terms of historical periods, investigations will concentrate on the time of the introduction of modern scientific medicine in the late 19th and early 20th centuries.

The concept of 'multiple modernities' by Shmuel N. Eisenstadt is the theoretical approach of this project. It allows to

explain processes of modernization by looking at contingent historical events and thereby to capture the environment and the intentions of historical actors - it is, as Wolfgang Knöbl says - „contingency sensitive“. The *idealtypischen* constructs of certain 'levels' or 'zones' of modernity proposed by Eisenstadt are far from real social configurations or even historical detail. However, this project will contribute right here by studying historical transfer processes.

Wissenschaftliche Vorbereitung:
Heiner Fangerau, Ulm,
Alfons Labisch ML, Düsseldorf,
Christian Oberländer, Halle (Saale)

People

Deceased Members

Prof. Walter Frommhold ML,

28.8.1921 - 20.10.2010 Baden-Baden/
Germany, Radiology section

Prof. Frommhold became a member of the Leopoldina in 1970 for his pioneering works in x-ray diagnostics. Among other things his studies on selective bronchography positively influenced the early diagnosis of bronchial carcinomas.

Prof. Harold Edgar Henkes ML,

18.4.1918 - 5.9.2010 Voorst/Netherlands
Section for ophthalmology, otolaryngology and stomatology

Prof. Henkes became a member of the Leopoldina in 1982 for his formative works in the field of electro-ophthalmology and other ophthalmological works, such as those on diabetic retinopathy and eye changes accompanying metabolic disorders.

Prof. Wolfgang Hillen ML,

24.04.1948 - 17.10.2010 Erlangen/
Germany, Microbiology and immunology section

Prof. Hillen became a member of the Leopoldina in 2002, among other things for his research on tetracycline resistance in E.coli. He was able to develop a tetracycline repressor/operator as part of a system modelling the molecular mechanisms of a repressor.

Prof. Riegomar Rieger ML,

17.2.1930 - 14.9.2010 Gatersleben/
Germany, Genetics/molecular biology and cell biology section

Prof. Rieger became a member of the Leopoldina in 1969 for his works on various problems related to theoretical mutation research.

Prof. Walter Siegenthaler ML,

14.12.1923 - 24.10.2010 Zurich, Switzerland,
Internal medicine section

Prof. Siegenthaler was welcomed to the ranks of the Leopoldina in 1981 for his works in the field of internal medicine

and pathophysiology, which resulted in numerous standard medical textbooks, among other things.

Prof. Heinz Günter Viehe ML,

17.6.1929 - 2.10.2010 Beersel, Belgium,
Chemistry section

Prof. Viehe became a member of the Leopoldina in 1977 for his internationally influential works on ynamines, for which he developed several syntheses.

Newly elected members of the Academy, 28 September 2010

Adrianus Aertsen, Freiburg (Germany), professor of neurobiology and biophysics at the University of Freiburg's Institute of Biology III (neurosciences section)

Matthias W. Beckmann, Erlangen (Germany), professor of gynaecology and obstetrics, director of the gynaecological section at Erlangen university hospital (gynaecology and paediatrics section)

Tobias Bonhoeffer, Martinsried (Germany), professor of neurobiology and director of the Max Planck Institute of Neurobiology, Martinsried (neurosciences section)

Peter Carmeliet, Leuven (Belgium), professor of medicine and director of Vesalius Research Center, Leuven, Belgium (anatomy and anthropology section)

Manfred Dietel, Berlin (Germany), professor of pathology and director of the Charité Berlin Institute of Pathology (pathology and forensic medicine section)

Günter Emons, Göttingen (Germany), professor of gynaecology and obstetrics, director of Göttingen university gynaecological section (gynaecology and paediatrics section)

Michael Hertl, Marburg (Germany), professor of dermatology and venereology,

director of the dermatology and allergology section at Phillips-Universität, Marburg (internal medicine and dermatology section)

Hannu Juhani Korkeala, Helsinki (Finland), professor of food hygiene and head of the Department Of Food And Environmental Hygiene, Helsinki, Finland (veterinary medicine section)

Jean Krutmann, Düsseldorf (Germany), professor of environmental health research and director of the Environmental Health Research Institute at Heinrich Heine University, Düsseldorf (internal medicine and dermatology section)

Hans Lassmann, Vienna (Austria), professor of neuroimmunology at the Medical University of Vienna and head of the neuroimmunology department at the Centre for Brain Research, Medical University of Vienna (pathology and forensics section)

Charlotte Niemeyer, Freiburg (Germany), professor of paediatrics and director of the Division of Paediatric Haematology and Oncology at Freiburg Centre for Pediatrics and Adolescent Medicine (gynaecology and paediatrics section)

Heidi Pfeiffer, Münster (Germany), professor of forensics and director of the Forensics Institute at the University of Münster (pathology and forensics section)

Karl H. Plate, Frankfurt am Main (Germany), professor of neuropathology at the Goethe University and director of the Neurological Institute (Edinger Institute) (pathology and forensics section)

Rolf Rossaint, Aachen (Germany), professor of anaesthesiology and director of the anaesthesiology department at RWTH Aachen University medical faculty, at the university hospital (Sur-

gery, Orthopaedics and Anaesthesiology section)

Gerold Schuler, Erlangen (Germany), professor of dermatological and sexually transmitted diseases and director of the dermatology department at Erlangen university hospital (Internal Medicine and Dermatology section)

Karl H. Welte, Hannover (Germany), professor of paediatric oncology and director of Hannover Medical School Institute of Molecular Haematopoiesis (Gynaecology and Paediatrics section)

Lothar Heinz Wieler, Berlin (Germany), professor of microbiology and veterinary epidemiology and director of the

Institute of Microbiology and Veterinary Epidemiology at Freie Universität Berlin (Veterinary Medicine section)



Leopoldina
Nationale Akademie
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Abbreviations

ML = Member of the Leopoldina