



Leopoldina

news

Deutsche Akademie der Naturforscher Leopoldina –
German National Academy of Sciences

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Resistance to antibiotics calls for new strategies

Publication of a joint statement by the Leopoldina and the Academy
of Sciences and Humanities in Hamburg

A growing number of infections worldwide are caused by bacteria resistant to antibiotics – and ever fewer effective antibiotics are available. As a result, it is becoming difficult to treat infected patients successfully. In response to this situation, the Academy of Sciences and Humanities in Hamburg and the German National Academy of Sciences Leopoldina published the joint statement “Antibiotic Research: Problems and Perspectives”, which includes eight recommendations on preventing the further spread of antibiotic resistance and on developing urgently needed antibiotics.

“This development is a cause for grave concern. Our statement focuses on the contribution by research and on the necessary parameters in society”, said Prof. Ansgar W. Lohse, spokesperson for the Working Group on Infection Research and Society at the Academy of Sciences

and Humanities in Hamburg. He also said that real incentives are needed to promote new and more intensive antibiotic research and to push the development of effective medications.

“This issue is a task facing society as a whole”, said Leopoldina President Prof. Jörg Hacker ML. “We certainly need to see greater research endeavours and a faster translation of the findings into applications, but we also need open dialogue on the responsible use of antibiotics and on how to prevent resistances.” A round table will now be convened to discuss the issue with all relevant parties. (mab)



► **Antibiotika-Forschung: Probleme und Perspektiven** (Antibiotic Research: Problems and Perspectives), Berlin: De Gruyter, 2013, ISBN 978-3-11-030667-5, € 29.95 (Full statement in German only, English summary included).

► The statement is available as a free eBook at: www.degruyter.com/isbn/9783110306675
A briefing paper on the statement can be downloaded for free (in English) at:
www.leopoldina.org/uploads/tx_leopublication/2013-01-28-Antibiotika-kurz-EN.pdf
A Leopoldina podcast featuring an interview with Prof. Ansgar W. Lohse is available in MP3 format in the media library (in German): www.leopoldina.org/de/presse/mediathek/

Dear members

and friends of the Leopoldina,

at the start of the year, the Leopoldina and the Academy of Sciences and Humanities in Hamburg published a joint statement on a two-fold



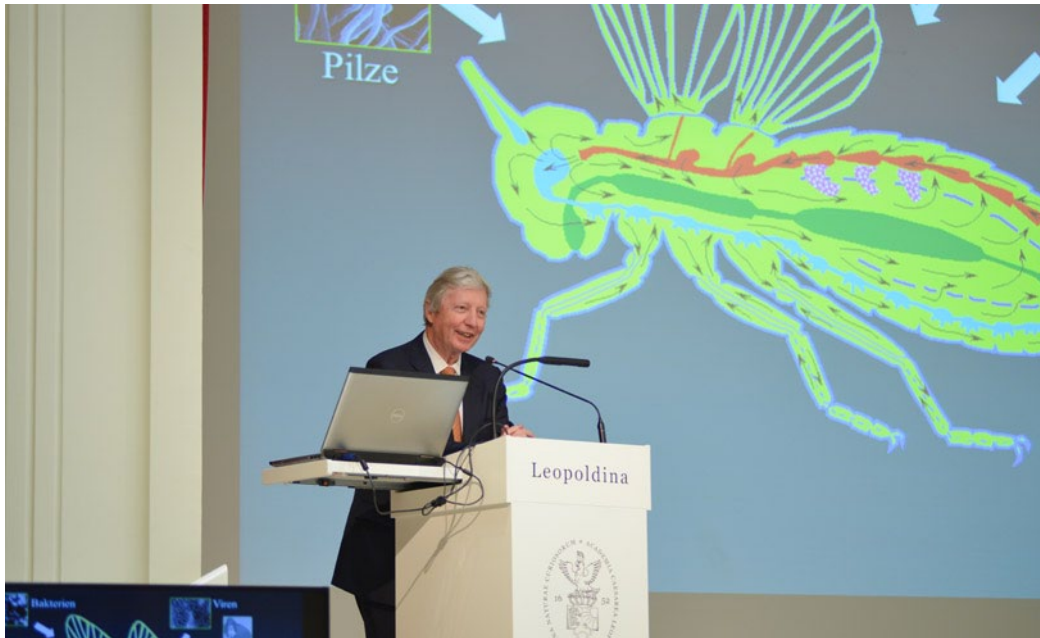
issue of global relevance: countering the spread of bacteria that are resistant to antibiotics, and developing new and effective antibiotics. To tackle these issues, the scientific community

needs the support of society. In publishing the statement and organising related events, we aim to raise awareness about the implications of these issues among policymakers and the public. The key content of the statement is also available as a podcast in the Leopoldina media library. Here you can listen to an interview with Prof. Ansgar W. Lohse, in which he clearly explains the background and reasons for the academies' interest in antibiotics research. You will find the link to the media library on the first page of this newsletter underneath the article about the statement. This issue of the newsletter is the first to include clickable links directly in the PDF that provide our readers with further information. For example, they take you to multimedia content or comprehensive conference reports that would exceed the limits of this newsletter. I hope that you will enjoy reading this latest edition of our newsletter.

Best wishes,

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Interview



Jules Hoffmann at his lecture in the Leopoldina banquet room. Photo: Markus Scholz

“I am not the only singer in the choir”

Jules A. Hoffmann ML, winner of the 2011 Nobel Prize in Medicine, talks about how his research on *Drosophila* has increased our understanding of immunity in humans, and the sometimes arduous road to success

The main focus of Prof. Jules A. Hoffmann's research is the development of natural immunity. At the traditional Leopoldina Christmas Lecture, which was held in Halle on 18 December, he described the pioneering work that earned him the Nobel Prize in Medicine in 2011 and serves as the basis for developing new strategies to counter the spread of infectious diseases. Before the lecture, Caroline Wichmann spoke to Hoffmann on behalf of "Leopoldina aktuell" about his research on the immune systems of fruit flies.

How did you become interested in immunology research?

Hoffmann: My father was an entomologist. He taught me how to work with insects. Insects account for about 80 percent of the planet's animal species; they destroy about one third of all crops, and one-third of the world's population is at risk of contracting a disease transmitted by insects. In the 1960s we already knew that insects are highly resistant to infections by fungi, viruses, bacteria, parasites etc. The question was why. When I was a student at the

University of Strasbourg, I met Pierre Joly, whose research group was working with grasshoppers and hormones. When we began doing research together, we were convinced our work was important, but we never dreamed our findings would be of direct relevance to human health.

*What happened then, and when did *Drosophila* come into play?*

Hoffmann: That wasn't until later. We worked with grasshoppers at first. It's important to understand that there are several levels when you're talking about infection resistance. First of all we needed to find out how insects recognise that there's an infection, and later we looked at what effector molecules they produce to ward infections off. It took us years to work through all that in detail, and it was only then that we could look at the genetic aspect. However, I couldn't have studied effector molecules without the thorough grounding in chemistry I received as a post-doctoral researcher with Peter Karlson ML in Marburg. He was also a member of the Leopoldina, and I would

like to dedicate my Leopoldina Christmas Lecture to him as my teacher.

So your research focused on innate immunity from the very beginning?

Hoffmann: When people talked of "immunity" when I was a student, they meant antibodies and lymphocytes – what we refer to as "adaptive immunity" today. It was known that there was another type of immunity besides this type, namely innate immunity, but no models had been developed for studying it. We weren't initially thinking along these lines either, but it soon emerged that a number of the substances that we found were present in humans, as well. In the 1990s, an increasing number of researchers, particularly in medical schools in the US, became interested in the stimulation of adaptive immunity, the type that involves the production of antibodies. Let me add a few words of explanation here. Innate immunity is the kind that comes into play when you cut yourself shaving in the morning, for example. It goes into action right away, like a roadblock, and prevents the cut from getting

infected. Adaptive immunity, the kind that involves antibodies, on the other hand, takes four or five days to become effective. Back in those days, it was assumed that innate immunity could stimulate adaptive immunity, but no one had proved that yet. As we progressed in our research, I approached scientists in the US, among them Charles Janeway, and we tried to find out if common mechanisms were at work in fruit flies and mice. We soon discovered that a number of proteins, including Toll-like receptors, play a role in innate immunity in insects. A whole new field of research opened up, and we began to understand that innate immunity plays a key role in both fruit flies and mice, both as a first line of defence and in the activation of adaptive immunity.

Your research was a major breakthrough in the field of immunology.

Hoffmann: I played a part, but I see it as a joint effort by many excellent researchers, staff members and students. I don't think this breakthrough would have been possible without international cooperation. It was a process of exchange, and we also received the funding we needed – here in Europe in the beginning, and from the 1990s on, from the American National Institutes of Health, as well. I see it as the achievement of a wonderful community of people working together towards a common goal. The discoveries we made led to new insights, which in turn had many

different consequences. We now know that innate immunity plays an essential role within adaptive immunity. It's important for vaccination, for example. Vaccination involves injecting an inactivated form of a specific virus to stimulate the production of antibodies against that virus by the immune system, but today we know that vaccines are much more effective if so-called adjuvants are added. Adjuvants are agents that enhance immune response, and many of them work via Toll-like receptors. Our discoveries have also contributed to our understanding of autoimmunity. We speak of autoimmunity when the body develops an immune response to its own cells and tissues in the absence of infection. Toll-like receptors are involved here too. Our findings also have a wide range of practical applications in fighting inflammation and other infections. Immunotherapy is a young field that is developing rapidly.

Has receiving the Nobel Prize made it easier for you to conduct your research?

Hoffmann: It's actually been harder for me to do my own research as I gave at least 80 lectures all over the world in 2012. I am very happy to accept a lot of the invitations though – like this one to speak at the Leopoldina in Halle. I have been a member since 1987 and have also served as a senator. I haven't seen the new building yet so it is a real pleasure to come here now and give a lecture.

But surely it makes a big difference to be so highly recognised as a basic researcher?

Hoffmann: It does make a difference because this recognition extends to insect studies and research on innate immunity in general. These were fields that were not taken very seriously in the past. Research on immunity in insects in particular was not considered a serious area for study. But, as I like to say: I am only one singer in a very big choir. There are lots of singers out there and many other researchers would have been worthy of the prize. Incidentally, the name Toll comes from Leopoldina member Christiane Nüsslein-Volhard's research. She has already received the Nobel Prize. I was genuinely surprised to be awarded the Nobel Prize myself!

Will your Leopoldina lecture focus on a particular area of your research?

Hoffmann: No, when I give a lecture it's usually to a mixed audience. So I prefer to provide a general overview of my work. I gave this same talk for my Nobel Lecture, of which a video is available on the Nobel Prize website.

Thank you very much, Professor Hoffmann.

🔗 *Watch the Nobel Lecture at: www.nobelprize.org/nobel_prizes/medicine/laureates/2011/hoffmann-lecture.html*

The 2011 Nobel Prize in Medicine

Work on immune system honoured

Jules A. Hoffmann was awarded the Nobel Prize in Medicine along with US researcher Bruce A. Beutler. They received the prize for their research on the immune system and particularly for their discoveries on how innate immunity is activated. They shared the Nobel Prize in Medicine with Canadian researcher Ralph M. Steinman for his discovery of the dendritic cell and its role in adaptive immunity.

The Nobel Committee said that it awarded the prize to the three researchers because their work revolutionised our understanding of the immune system. Beutler and Hoffmann discovered receptor proteins that recognise bacteria and other microorganisms when they enter the body and can activate the body's first line of defence. Steinman discovered dendritic cells, the next step in the body's immune response. On announcing its decision, the Committee said the three immunologists' discoveries had opened up new fields of research that could facilitate the development of methods for preventing and treating infections, cancer and inflammatory diseases.

Biography

Jules A. Hoffmann

Jules Hoffmann was born in 1941 in Luxembourg and has been a French citizen since 1970. He studied biology and chemistry at the University of Strasbourg and earned his doctorate in 1969. Hoffmann has worked at the Centre National de la Recherche Scientifique (CNRS) in Strasbourg since 1964 and has been a research director there since 1974. In 1978 he was appointed Professor of Zoology and General Biology at the University of Strasbourg. From 1994 to 2006 Hoffmann directed the CNRS Institute of Molecular and Cellular Biology. In 2007 and 2008 he was president of the French Académie des sciences in Paris.

International Relations

Leopoldina intensifies cooperation with France

Conference on the Enlightenment in Paris inaugurates series of events

January 2013 saw the 50th anniversary of the signing of the Treaty of Friendship between France and Germany. To honour the jubilee of this landmark event, the German National Academy of Sciences Leopoldina has intensified cooperation with its French partner organisation, the Académie des sciences. A series of joint symposia and the signing of a cooperation agreement between the two Academies in April are just some of the highlights scheduled for this jubilee year. The series of Franco-German events was inaugurated with the symposium “Aufklärung: gestern, heute, morgen - Les lumières: Hier, aujourd’hui, demain” (“Enlightenment: past, present and future”). Held in Paris from 6 to 9 February, the symposium was hosted by the Leopoldina and the Académie des sciences in cooperation with the Académie des sciences morales et politiques and the Berlin Brandenburg Academy of Sciences and Humanities.

An interdisciplinary committee headed by Prof. Claude Debru ML was responsible for preparing the programme. Many other members of the Leopoldina were also involved in these preparations and contributed to the success of the event in Paris. These included: Prof. Dieter Birnbacher ML, Prof. Martin Carrier ML, Prof. Detlev Ganten ML, Prof. Annette Grüters-Kieslich ML, Prof. Jules Hoffmann ML, Prof. Eberhard Knobloch ML, Prof. Ursula Klein ML, Prof. Andreas Kleinert ML, Prof. Walter Rosenthal ML and Prof. Gereon Wolters ML.

Detlev Ganten represented the German side at the opening of the conference on behalf of the President of the Leopoldina. In his speech he emphasised the international character of the Enlightenment and the key role which the

academies of science played in initiating this movement, a spirit of cooperation that should serve as an example and inspiration for scientific cooperation today. The many lectures held in the rooms of the Fondation Singer-Polignac focused on individual aspects of the Enlightenment as a truly European endeavour, and the wave of innovations it generated in the humanities, in culture and society.

Although the Enlightenment took very different forms in Germany and France, its pioneers in both countries had a shared belief in the advancement of humanity and in the central role of the sciences in driving this process. The conference participants agreed that the grand ideals of the Enlightenment are still being pursued today and quoted Kant, who famously said that he lived in the Age of the Enlightenment, but not in an Enlightened Age. The question of how the spirit of the Enlightenment can contribute to shaping the future of modern society was the central theme of the second day of the conference. The closing discussion at the Hôtel de Beauharnais, residence of the German ambassador to France, focused on German-French cooperation in science as a source of momentum and inspiration for both countries and indeed, the whole of Europe. There was general agreement that there is a lot of room for development in this field, and that these developments are not only political issues, like the creation of compatible structures, for example, but are first and foremost a question of the activities and attitudes of individual scientists. Detlev Ganten closed the conference with a reference to Voltaire’s *Candide*, who said “We have to cultivate our garden”, and sowed the seeds for tomorrow. (rn)



Swedish Academy visits the Leopoldina

A delegation of the Royal Swedish Academy of Sciences visited the Leopoldina in Berlin and Halle on 30 and 31 January. The talks with Prof. Staffan Normark, Permanent Secretary, and Prof. Per Hedenqvist, Executive Director, centred on the profile of both academies and the focal points of their work. Many points of convergence emerged in the course of conversation, especially in the field of policy advice. Interesting parallels also emerged in the international cooperations of both academies and their partner institutes. With such a lot of common ground established, the talks turned to a practice-oriented exchange of ideas on different ways of working. The representatives of both academies agreed to strive for closer cooperation on content and supply each other with regular updates on their national and international activities. (rn)

EASAC Bureau meets with EU Science Advisor

On February 12, members of the EASAC-Bureau, the European Academies Science Advisory Council, met with Prof. Anne Glover, Chief Scientific Advisor of the President of the EU Commission José Manuel Barroso. The main focus of the talks led by EASAC President Prof. Sir Brian Heap, President-Elect Prof. Jos van der Meer and former President Prof. Volker ter Meulen ML was the question of how EU academies’ expertise can best be fed into the policy-making process. Glover updated the EASAC representatives on her current activities, which include an initiative to create a network of national science advisors for EU governments. Glover also confirmed her attendance at the EASAC General Assembly at the Leopoldina in June. (csd)

► The new EASAC newsletter is available on subscription at www.easac.eu

First Leopoldina and KAST joint conference

Founding Conference on sustainable cooperation with the Korean Academy of Science and Technology (KAST) in Halle

In spring last year, the Leopoldina and KAST signed a Memorandum of Understanding, a cooperation agreement, which gives the Leopoldina much better access to one of Asia's leading science locations. KAST is also a key policy advisor of the South Korean government. As part of this agreement, the academies resolved to host a top-level joint science conference on a regular basis. The Founding Conference took place on 25 and 26 November in Halle.



The Korean Scientists in Halle.

Photo: Markus Scholz

Headed by Prof. Henning Beier ML (RWTH Aachen) and Prof. Il-Hoan Oh (Catholic University of Korea, Seoul), German and Korean stem-cell researchers met to discuss the current state of research in their respective countries. They found that although extensive research in this field is being conducted in both Germany and Korea, the respective working conditions and approaches differ greatly. This is partly because the researchers are working within quite different legal frameworks. Good contacts between individual scientists have facilitated cooperation between the two countries. For example, a South Korean research institute has been named after

Prof. Hans Schöler ML (Münster), who also took part in the conference.

During the conference it emerged that there were knowledge gaps on both sides concerning the work of the scientific community in the other country. Both German and Korean scientists were very impressed with the research activities of their foreign colleagues, and many complementary research initiatives were identified. Clinical approaches predominate in Korea, while Germany has a clear focus on basic research. An exploration of the two approaches will form the

basis of an international conference on stem-cell research jointly hosted by the Leopoldina and KAST, which will take place in Seoul on 14 and 15 October 2013. Proposals were elaborated on the conference format, key themes and high-profile speakers. Young scientists will also be encouraged to participate. On the German side, the committee responsible for organising the conference includes Prof. Henning Beier ML (Aachen), Prof. Hans Schöler ML (Münster) and Prof. Martin Zenke (Aachen). (rn)

Leopoldina-NASAC workshop on water management

African and German experts convened in Naivasha (Kenya) on 26 and 27 November 2012 for a workshop on water management. This event was the second meeting in the four-year cooperation scheme between the Leopoldina and the Network of African Science Academies (NASAC) on the subject of water. The first conference in the series took place in March 2012. The Leopoldina delegation was headed by former President Prof. Volker ter Meulen ML and Prof. Peter Fritz ML.

Five detailed reports drawn up by the African academies provided the basis for workshop agenda. These included situation analyses and recommendations on

the water situation in North, South, East, West and Central Africa. The academies responsible for drawing up the reports were the African Academy of Sciences, the Academy of Science of South Africa (ASSAf), the Kenya National Academy of Sciences (KNAS) and the Académie Nationale des Sciences et Techniques du Sénégal (ANSTS). The challenge facing the group of German and African experts was to formulate scientifically founded recommendations for the whole of Africa on the basis of these reports. The workshop produced a first draft of a paper entitled "Water Management for Africa", which could serve as a tool for all the African academies of science both on a

national and continental level, for example in dialogue with the African Union Commission and political decision-makers within regional economic groupings.

Further key themes in this cooperation project funded by the Federal Ministry of Education and Research (BMBF) include adaptation to climate change and health. The aim of the project is to strengthen the voice of African academies as independent science advisors, to improve links between German and African research, and to build up close contacts with a circle of independent African experts, who can be contacted as potential consultants for BMBF project applications, for example. (csd)

Events

March

15 to 16 March, 3.00 p.m.

LEOPOLDINA SYMPOSIUM:

“Vision and Diabetes”

**MPI for Demographic Research,
K.-Zuse-Straße 1, 18057 Rostock/Germany**

Scientific organization: Rudolf Guthoff ML (Rostock) and Peter Wiedemann ML (Leipzig)

18 to 19 March

LEOPOLDINA SYMPOSIUM:

“Socio-Ecological Novelty – Frontiers in Sustainability Research”. On the occasion of the German-South African Year of Science 2012/2013

Vertretung des Landes Sachsen-Anhalt beim Bund, Luisenstraße 18, 10117 Berlin/Germany

19 March, 6.30 p.m.

PANEL DISCUSSION:

“Bridging Two Hemispheres: Policy Advice and Sustainability Research in Germany and South Africa”. On the occasion of the German-South African Year of Science 2012/2013

French Church of Friedrichstadt, Gendarmenmarkt 5, 10117 Berlin/Germany

26 March, 10.00 a.m.

LEOPOLDINA SYMPOSIUM:

“Personalisierte Medizin”

Academy of Sciences and Literature Mainz, Geschwister-Scholl-Straße 2, 55131 Mainz/Germany

27 March, 6.00 p.m.

LEOPOLDINA LECTURE:

Gerald Haug ML, Zurich: “Der Klimawandel aus geowissenschaftlicher Sicht”. On the occasion of the symposium of Leopoldina Class I with the ceremonial unveiling of the portrait of the former President Volker ter Meulen ML

Leopoldina, Banquet Room, Jägerberg 1, 06108 Halle/Germany

28 March, 11.30 a.m.

SYMPOSIUM OF LEOPOLDINA CLASS I:

“Vom Higgs-Teilchen bis zur Hollywood-Animation: Neue Anwendungshorizonte der Mathematik, Natur- und Technikwissenschaften”

Leopoldina, Auditorium, Jägerberg 1, 06108 Halle/Germany

April

9 April, 6.00 p.m.

SEMINAR ON THE HISTORY OF SCIENCE:

Kärin Nickelsen ML, Munich: “Otto Warburg, die Quanten und die Photosynthese”

Leopoldina, Auditorium, Jägerberg 1, 06108 Halle/Germany

23 April, 7.00 p.m.

LEOPOLDINA LECTURE:

Hans-Peter Zenner ML, Tübingen: “Beethoven und seine Taubheit”

Tübingen University, Alte Aula, Banquet Room, Münzgasse 30, 72070 Tübingen/Germany

May

7 May, 6.00 p.m.

SEMINAR ON THE HISTORY OF SCIENCE:

Jürgen Stolzenberg, Halle: “Kant und die Medizin”

Leopoldina, Auditorium, Jägerberg 1, 06108 Halle/Germany

15 to 18 May

INTERNATIONAL CONFERENCE OF THE GLOBAL YOUNG ACADEMY:

“Demography and Global Research”

Leopoldina, Auditorium, Jägerberg 1, 06108 Halle/Germany

30 May to 11 July

LEOPOLDINA PHOTO EXHIBITION:

“Neue Bilder vom Alter(n)”

Kreishaus Lüchow-Dannenberg, Königsberger Straße 10, 29439 Lüchow/Germany

June

4 June, 6.00 p.m.

SEMINAR ON THE HISTORY OF SCIENCE:

Philip van der Eijk, Berlin: “Die Stellung von Krankheit in teleologischen Weltanschauungen: Platon, Aristoteles, Galen”

Leopoldina, Auditorium, Jägerberg 1, 06108 Halle/Germany

10 June, 9.00 a.m.

SYMPOSIUM:

“Moderne Impfstrategien”. On the occasion of the 50th anniversary of the Elysée Treaty

Kaiserin Friedrich-Haus, Robert-Koch-Platz 7, 10115 Berlin/Germany

July

2 July, 6.00 p.m.

SEMINAR ON THE HISTORY OF SCIENCE:

Sabine Anagnostou, Marburg: “Missionspharmazie: Wissensaustausch – Wissensbildung – Wissenstransfer”

Leopoldina, Auditorium, Jägerberg 1, 06108 Halle/Germany

5 July, 5.00 p.m.

LEOPOLDINA NIGHT:

On the occasion of the 12th Long Night of Sciences in Halle

Leopoldina, Jägerberg 1, 06108 Halle/Germany

September

20 to 22 September

ANNUAL ASSEMBLY OF THE LEOPOLDINA:

“Mind, Brain, Genome, Society” with a Lecture of Daniel Kahneman, Nobel laureate in Economics 2002, Princeton/USA

Leopoldina, Jägerberg 1, 06108 Halle/Germany

Scientific organization:

Onur Güntürkün ML (Bochum)

People

Deceased members

Norbert Hilschmann ML

8.2.1931 - 2.12.2012 Göttingen/Germany
Section Microbiology and Immunology

Wilhelm Pritzkow ML

29.10.1928 - 11.2.2013 Merseburg/Germany
Section Chemistry

Wolfgang Spann ML

29.8.1921 - 11.1.2013 Munich/Germany
Section Pathology and Forensic Medicine

Willy Taillard ML

15.3.1924 - 22.1.2011 Collonges/Switzerland
Section Surgery, Orthopaedics, Anaesthesiology

Carl R. Woese ML

15.7.1928 - 30.12.2012 Urbana/USA
Section Genetics/Molecular Biology and Cell Biology

Vladimir Zvara ML

22.4.1924 - 26.7.2012 Bratislava/Slovakia
Section Surgery, Orthopaedics, Anaesthesiology



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der Wissenschaften

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Abbreviations:

ML = Member of the Leopoldina