

# A Showcase for the Future

On September 7, the Federal Minister of Research, Annette Schavan, opened the new Max Planck Science Gallery at the Berlin Science Forum in front of 120 invited guests from the worlds of politics and science

Large-format touch screens are replacing conventional displays; visitors can almost grasp knowledge with their hands, surfing the world of research of the 80 Max Planck Institutes just like on a computer, dipping into different research subjects. “Thank you to the Max Planck Society, which has made a major contribution over many years in bringing science into the heart of society and now underpins this with this wonderful idea of the Science Gallery,” remarked Minister Schavan. Max Planck President Peter Gruss emphasized that the new showroom should be the starting point for entering into a dialogue with the public. The Gallery will provide constantly changing insights into research and act as a “showcase for the future, inviting wonder and amazement.” In addition to Members of the Bundestag, guests at the event included ministers, representatives from the world of science, and publishers Friede Springer and Stefan von Holtzbrinck. In the ensuing panel discussion with Stefan von Holtzbrinck, Annette Schavan and Peter Gruss, science journalist Gert Scobel (3sat) asked how, aside from exhibitions, the most complex science subjects are brought to the public. Do internet channels such as Facebook and Twitter offer new options and do they even reduce the importance of conventional media such as newspapers and television? Peter Gruss confirmed that good science journalists are still in demand: “These people have to be able to translate the language of researchers so that the extract is understood.” The fact that science, which left its famous “ivory tower” long ago, must itself also get active in an exchange with the public is obvious. But scientists are primarily responsible for the acquisition of new knowledge. A paradox here is the fact that this role is not really appreciated in the media, as Ms. Schavan stressed: “Nothing changes society as much as the knowledge that science and research bring, but this rarely features in the main news.”

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Cheerful celebration of the new Science Gallery: Facilitator Gert Scobel (3sat), publisher Stefan von Holtzbrinck, Federal Research Minister Annette Schavan and Max Planck President Peter Gruss (from left)

Photos: Arne Sattler

## Future Dialogue in India

Siemens and the Max Planck Society organize an international discussion forum in New Delhi on “Sustainable Cities”

The focus was the question of how megacities can provide decent living conditions for their inhabitants. The aim of the conference was to bring together politicians, business leaders and scientists to find solutions to a pressing world problem. With its rapid population growth and its three megacities –

Delhi, Calcutta and Mumbai – India was the perfect location, and Indian interest was correspondingly high. The speakers provided immediate insight into the main problems of sprawling cities with over a million inhabitants, ranging from lack of basic food and lack of water supply to inadequate medical

aid and lack of electricity networks, transportation systems and housing. The one-day conference made it clear in particular that major world problems can be solved only if science, industry and politics work together and there is a global pool of accessible solution strategies.

# “We need more basic research in Africa”



Stefan H. E. Kaufmann

For the first time, the Max Planck Society is setting up a Max Planck Research Group in Africa. The new research group of the Max Planck Institute for Infection Biology will start work in 2012 at the National Research Institute for Tuberculosis and HIV in Durban, South Africa. Stefan H. E. Kaufmann, Director at the Berlin Max Planck Institute, describes why it is important to conduct basic research on infectious diseases in Africa.

*Why is the Max Planck Society setting up a research group in South Africa?*

**Stefan Kaufmann:** In setting up a Max Planck Research Group, our aim is to promote basic research on HIV and tuberculo-

sis in Africa. Scientists will benefit from the physical proximity to the centers of infection. Knowledge from laboratory and clinic can then have a mutually stimulating effect, because up to now, mainly clinical studies were conducted in Africa. They wanted to investigate the effectiveness of drugs against infectious diseases that are widespread there. In South Africa and other countries in Africa, there is a diabolical connection between two of the most dangerous infections; the high number of AIDS patients has also meant a resurgence of tuberculosis. As a result of their weakened immune systems, HIV patients are particularly vulnerable to tuberculosis pathogens.

*Why did you choose Durban?*

An important criterion was the fact that a new research institute dedicated to investigating HIV and tuberculosis is being built there. The KwaZulu Natal Research Institute for Tuberculosis and HIV is a project run by the University of KwaZulu Natal and the Howard Hughes Medical Institute in the US. The Max Planck Research Group will be based at this institute and will find excellent working conditions there. Durban also has a number of well-equipped clinics where patients with a form of tuberculosis that is resistant to current drugs can be treated.

*What will the Research Group be looking at?*

It will conduct basic research into HIV or tuberculosis at the highest scientific level.

*When will the Research Group be starting its work?*

The application and selection procedures are currently under way. We hope that the Group will be ready to start by the end of 2012, by which time the new institute should also be completed.

*The only tuberculosis vaccine currently available is over 90 years old. What makes the development of vaccines against tuberculosis so difficult?*

The problem lies in activating a different arm of the immune defense, namely the cellular immune response. Effective vaccines boost the production of proteins, so-called antibodies that bind to pathogens and then destroy them. The tuberculosis pathogen, however, is a bacterium that hides inside cells in the body and therefore can't be reached by antibodies. Our aim is thus to stimulate the cellular immune response of the body because it can then also track down the pathogens in the cells and render them harmless. This, however, is regulated more strongly by the body. Matters are compounded by the fact that we must be better than nature in developing vaccines, because the body can keep the bacteria in check for a long time – but it can no longer get rid of them.

*How could the development of new vaccines and drugs be accelerated?*

A very important point is the improved combination of basic research and clinical studies. At present, there are few points of contact, so the previously rigid scheme of pre-clinical and clinical research must be deconstructed. If, for example, an active ingredient shows unexpected effects in a patient, this must be quickly reverted to basic research.

*How long will it be before a new vaccine against tuberculosis reaches the market?*

Our own vaccine candidate is in phase II of clinical development at Stellenbosch, South Africa. A total of twelve vaccine candidates are currently being clinically tested. If all tests run successfully, the first could be used in 2016.

Interview: Harald Rösch

Photos: MPI for Infection Biology (top); Siemens (bottom)



No simple solutions:  
Facilitator Mini Menon, Joan Clos, Peter Gruss and Peter Löscher on the Future Dialogue podium (from left)

## World's Largest Language Archive

The Berlin-Brandenburg Academy, the Royal Netherlands Academy of Sciences and the Max Planck Society finance the "Language Archive"



The Berlin-Brandenburg Academy

Languages evolve, change and die out; globalization, worldwide migration and technological innovations have sharply accelerated this change. There are currently around 6,500 languages in the world, most of which will, in all probability, no longer be spoken in a few generations. This change can't be stopped, but attempts should be made to safeguard the linguistic and thus also the cultural wealth of mankind and make it accessible to systematic research. In recent years, as part of the "Documentation of endangered languages" funding initiative at the Volkswagen Foundation, comprehensive data on endangered languages has been recorded by numerous teams throughout the world, digitally archived at the Max Planck Institute for Psycholinguistics and made accessible by a series of tools. The results of this initiative, along with large language corpora from many other scientists, are part of the "Language Archive" that, with around 80 terabytes of data from 200 languages, is currently the world's largest language corpus. The aim is to systematically expand it in the future, further decipher it with a variety of tools, and link it worldwide with other data repositories. It is freely accessible within the framework of legal possibilities and ethical obligations.

## Dancing on the Volcano

The series of talks entitled "Responsibility of Science" by the Max Planck Society continues to attract considerable interest. Some 170 visitors came to Mainz for the fourth in the series at the end of September.

The subject "Geoengineering – Opportunity or Threat for the Earth" looked at how far scientists should intervene in the Earth's system in order to cushion the consequences of climate change. Meinrat Andreae, Director at the Max Planck Institute for Chemistry, outlined prominent concepts of geoengineering, including re-enacting essentially violent volcanic eruptions in which aerosols are formed by the discharge of millions of tons of sulfur into the stratosphere, weakening the solar radiation and thus lowering the global temperature. Hauke Schmidt from the Max Planck Institute for Meteorology analyzes such concepts as part of an EU project using computer simulations and assumes that the global temperature could actually be lowered to a pre-industrial level. However, the studies also show that the global water regime would be significantly affected and the amount of precipita-

tion would fall disproportionately. Both scientists thus also refer to the risks that particularly Carl Friedrich Gethmann had looked at. The philosopher and expert for technology consequences assessment of the University of Essen-Duisburg emphasized the many uncertainties with interference in complex systems. Nevertheless, German researchers should theoretically deal with geoengineering because expertise is needed if the call for practical application becomes louder in other industrialized countries. The forum in Mainz was facilitated by the science journalist Jan Lublinski.

The last event in the series for the moment took place on December 1 in Munich. The subject: "The Manipulated Mind – Methods in Neuroenhancement – What Does Science Say?" One of the people involved is Florian Holsboer, Director of the Max Planck Institute of Psychiatry.



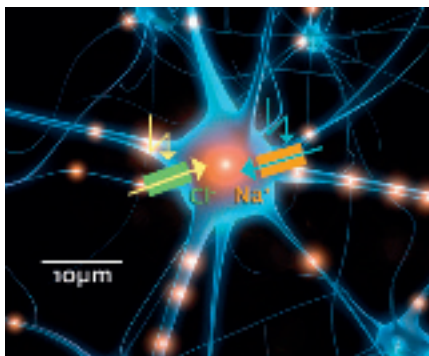
"Yes, but ...": Those who took part in the discussion agreed that the pros and cons of what new findings offer from a scientific point of view must be carefully weighed up.



# Molecular Light Switches Against Retinal Diseases

Sanofi will provide Frankfurt Max Planck researchers with funding worth 450,000 euros in the next three years to investigate retinal diseases

Max Planck Innovation, the technology transfer subsidiary of the Max Planck Society, and Fovea Pharmaceuticals, a subsidiary of the pharmaceuticals company Sanofi, have signed a license agreement for the application of channel rhodopsins, which, if successful, should restore the sight of blind patients. The pigment proteins were discovered in 2002/2003 by Peter Hegemann of the Max Planck Institute of Biochemistry in Martinsried, together with Georg Nagel and Ernst Bamberg from the Max Planck Institute of Biophysics, and come from a small single-celled green alga. The unique nature of the channel rhodopsins lies in the fact that, on exposure, they become permeable to positively charged ions, as a result of which an electrical signal is triggered on the cell membrane. The corresponding gene sequences can also be expressed in other cells, such as nerve cells. Incorporated into the cell membrane, nerve cells can be switched on and off with these light-controlled ion



Switches in the neuron: Channel rhodopsin-2, activated by blue light, switches the nerve cell "on"; halorhodopsin, activated by yellow light, switches it "off."

channels. "We can now, for the first time, control the activity of nerve cells by light, without electrons or any chemical modification, without any problem and with as yet unparalleled spatial resolution," explains Ernst Bamberg. Now the channels are to be further developed so that nerve cells of the retina in the

human eye can be converted into light-sensitive cells with which patients whose sensory cells have been destroyed can again detect optical stimuli. A gene therapy such as this could be used in hereditary diseases such as retinitis pigmentosa, retinal dystrophies and glaucoma, age-related macular degeneration and diabetic retinopathy. Via its subsidiary Max Planck Innovation, which is responsible for the commercialization of Max Planck patents, the Max Planck Society receives initial and milestone payments of up to 26.4 million euros as part of the awarded license. Sanofi, in turn, receives the worldwide exclusive rights and secures for itself global rights to the results of the collaboration. "The history of the discovery of the light-activated ion channels is an example of how new techniques can be produced from knowledge-driven basic research, leading to new treatment methods for humans," comments Egenhard Link from Max Planck Innovation.

## On the Net



### The mysterious hominids from the Denisova Cave

Bence Viola from the Max Planck Institute for Evolutionary Anthropology in Leipzig discovered the tooth fragments together with Russian colleagues in the Denisova Cave in the Altai Mountains. Initially, he thought the inconspicuous-looking object was the molar of a cave bear. But when the remaining fragments of the tooth turned up, it became obvious that it was the tooth of a hominid. DNA analyses revealed that it hailed from a previously unknown early human species living in Asia at least 30,000 years ago.

<http://www.mpg.de/4742597/Denisova-cave>

### Sharper than theory allows

Previously, the law formulated by Ernst Abbe in 1873 was regarded as the absolute lower limit. Objects lying closer to each other than 200 millionths of a millimeter, i.e. about one two hundredth of a hair's breadth, can no longer be distinguished from one another. The STED (Stimulated Emission Depletion) microscopy, which the physicist Stefan Hell from the Max Planck Institute for Biophysical Chemistry in Göttingen invented, allows scientists to gain insights into the nano world far beyond this limit.

<http://www.youtube.com/maxplancksociety>

### Research from the Living Room

Learning something new about oneself – and at the same time helping researchers. This is something anyone who is interested can now do, via a web panel for study participants. From their own home, they take part in online studies of the Max Planck Institute for Human Development, in which a team headed by Gerd Gigerenzer examines human rationality, risk and decision-making behavior. Registered participants can test their knowledge of human nature in the Opinion Club.

[abcwebpanel.mpib-berlin.mpg.de](http://abcwebpanel.mpib-berlin.mpg.de)