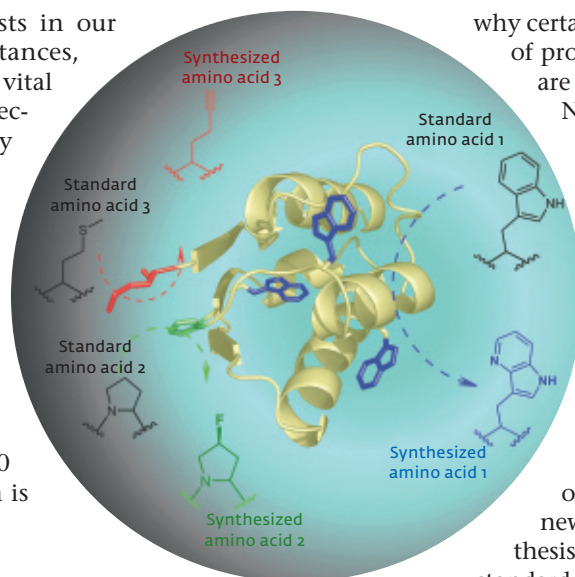


Genetic Code 2.0

New biological functions may be created by incorporating artificial amino acids in proteins

Proteins are the protagonists in our body. They transport substances, convey messages or carry out vital processes in their role as molecular machines. As a rule, they are made up of 20 standard amino acids whose sequence is already determined in the genetic code. In natural conditions, however, several hundred amino acids can be found and, of course, new amino acids can also be produced in the laboratory. The properties of these amino acids differ from the 20 standard amino acids, which is



For the first time, scientists were able to modify three amino acids in one protein in a single experiment.

why certain structural and biological characteristics of proteins can be modified when amino acids are integrated.

Nediljko Budisa and his research group at the Max Planck Institute of Biochemistry have now succeeded in substituting synthetic amino acids for three different natural ones in a single experiment. Until now, only one type of synthetic amino acid could be inserted into a protein in a single experiment. Budisa's method could be of great importance particularly for business and industry as, in his view, the production of synthetic proteins through genetic code engineering represents a solid basis for the development of new technologies. Thus, entirely new classes of products whose chemical synthesis has not been possible using only the 20 standard amino acids available in conventional protein engineering may now be open to exploration.

The Electronic LOFAR Telescope

The electronic LOFAR Telescope, a new generation of Radio technology, is officially commissioned



With the push of a button, Queen Beatrix of the Netherlands officially inaugurated the state-of-the-art LOFAR radio telescope.

Even the royal family was represented at the event. In June, Queen Beatrix of the Netherlands officially inaugurated the Low Frequency Array, or LOFAR for short. This completely electronic next-generation radio telescope enables astronomers to coordinate

use of a network of antennas that stretches thousands of kilometers from the core area in the northeast Netherlands across Europe. Three German remote stations have already been integrated into the project: Effelsberg near Bonn (Max Planck Institute for Radio Astronomy), Tautenburg near Jena and Unterweilenbach near Garching (Max Planck Institute for Astrophysics). The next station is already being planned in Bornim, near Potsdam. LOFAR can be pointed at several positions in the sky simultaneously and can be commissioned very quickly and flexibly. The extraordinary telescope uses sophisticated computer technology and the connections to each station are made via high-speed computer networks in order to combine the signals received into a high-resolution image of the sky.

One of the scientific goals of LOFAR is to investigate the development of distant galaxies and the properties of cosmic particles with high energies, as well as magnetic field structures and solar activity. When fully developed, LOFAR will consist of at least 36 remote stations in the Netherlands and 8 stations in Germany, France, the UK and Sweden. Currently, 22 stations are up and running, each of which comprises hundreds of dipole antennas. Together they form a huge virtual radio telescope the size of half of Europe.

“Anyone may become a killer”

According to a verdict in the European Court of Human Rights, the preventive detention presently in place in Germany is partly in breach of the convention on human rights. The German Federal Ministries of the Interior and of Justice have long discussed a reform of this virtual imprisonment after a prison sentence. Hans-Jörg Albrecht, Director of the Max Planck Institute for Foreign and International Criminal Law in Freiburg, explains how dangerous our lives really are and the future role of preventive detention.

Generally speaking, who is affected by preventive detention?

Hans-Jörg Albrecht: Originally, preventive detention was a measure that was applied equally to property, sexual and violent crime. It was influenced by the image of the habitual offender, which stems from the 19th century. In the past 20 years, there has been a gradual shift toward violent and sexual crime. Also, the focus has moved away from past behavior, which reflects how dangerous a person is, to the question of what can be expected from a criminal offender in the future.

Is there a reliable way to predict how dangerous a person will be?

In a strict sense, no. Anyone may become a killer. Of course, there are individuals who fall into certain risk categories; they may be predisposed to crime, or their personality structure may show signs of abnormality. In many cases, however, we still cannot say for sure how many members of a category become violent, and we certainly can't identify particular candidates. There are always people who will be set free only to commit serious offenses again. Other people, who would never again commit an offense were they to be set free, are placed in psychiatric care or kept in preventive detention.

Are there scientific analyses of how many people are unjustly imprisoned beyond their original sentence?

Such data is very scarce, for the simple reason that people who are imprisoned can't be tested. Some natural experiments do, however, confirm that risk profiling is associated with a high error rate. In the US



Hans-Jörg Albrecht

in the 1960s, thousands of inmates were released from forensic psychiatric care on court orders. As can be seen from the subsequent natural development, the majority of these people were never investigated for repeat offenses.

Is there similar data from Germany?

A similar study was recently presented in Bochum. It dealt with around 50 to 65 people for whom an application for subsequent preventive detention had been filed, but not granted. After around two or two and a half years, it turned out that most individuals from this group were not apprehended for serious offenses again. Only three or four were taken into custody for violent crime. About half of those were sentenced again, but were given fines or probation.

How safe are we here in Germany?

It is worth noting that the rate of extreme crime has become so low nowadays that it can hardly shrink any more. People's lives are much safer today than 10, 20, 30 or 100 years ago. Still, the safer their lives are, the greater their need seems to be for security. This is a paradox that is reflected in legal policy.

In what way?

Legislation on preventive detention is a patchwork. In the past, German criminal policy – in stark contrast to the rest of Europe – concentrated on making minimal ad hoc amendments to criminal laws in order to close spontaneously detected or sup-

posed security gaps. This created a complicated legal situation that, to some extent, is in breach of international conventions, and that must be remedied.

What is the role of the media in this development?

The media is very important, especially when it comes to the public's perception of the sexual homicide of children. Because of the media, there is a widespread belief that sexual homicide of children is on the rise. This perception is false. For the last 15 years,

only two to three such cases have occurred in Germany each year. As abominable as these crimes may be, we will never be able to achieve a society in which no serious violent crime is committed.

What do you think about the proposal to publish the domicile of ex-convicts and people released from preventive detention?

This would lead to something that was actually abolished in modern criminal law: the disclosure of sentences. It represents an additional punishment which is neither covered in criminal law nor in the personality rights that German law guarantees even criminal offenders.

How do you think that preventive detention should be regulated in the future?

Subsequent preventive detention must be abolished; the government is of the same opinion. In addition, serious offenders should be included in special programs where they are specifically prepared for the problems they will face once released. The expensive surveillance schemes that have been put in place by certain German states because of the recent release of some individuals from preventive detention would then become superfluous. The probability that people in this group would commit serious offenses again is so low that preparatory programs would provide as much security as around-the-clock police surveillance.

Interviewer: Julia Merlot

Energetic Talks

Future Dialogue 2010 in Beijing attracts more than 450 guests



Max Planck President Peter Gruss (third from right) spoke about the importance of basic research in ensuring tomorrow's energy supply. Other speakers of the panel "The future of energy supply" were Philip Campbell (moderator), Jason Grumet, Li Junfeng, Bao Xinhe and Xu Jianguo (from left).

"Powering the future" – the subject of this year's Future Dialogue – is probably the most daunting challenge facing humankind today. As the single largest consumer of energy and producer of greenhouse gases, China has a key role to play. Thanks to nine-figure investments, the People's Republic will soon become a global experimental laboratory for new energy technologies, ranging from 4th generation nuclear power plants to CO₂ storage. All this made Beijing the perfect place to host the conference. More than 450 Chinese and international guests, together with senior executives from major companies, political decision-makers and top scientists, attended the conference to come up with ways to resolve the energy crisis.

Peter Gruss, President of the Max Planck Society, was one of the organizers and also spoke about basic research on the panel "The future of energy supply." During the panel sessions, Günther Hasinger, Scientific Director of the Max Planck Institute for Plasma Physics, and Ferdi Schüth, Director at the Max Planck Institute for Coal Research, both gave inspiring talks about nuclear fusion and energy storage. Future Dialogue is a series of conferences organized by the Max Planck Society and Siemens in cooperation with Economist Conferences. Local organizers were the Chinese Academy of Sciences and the Energy Research Institute. The 2011 conference will take place in India.

Hans Schöler Lends His Name to Science

Top South Korean university names its new stem cell institute after the Max Planck scientist from Münster

Since the middle of August, "Hans Schöler Stem Cell Research Center" is the name of a new institute at the Ulsan National Institute of Science and Technology (UNIST). Naming the center after the Director at the Max Planck Institute for Molecular Biomedicine in Münster was a matter of personal importance to the President of UNIST, Moo Je Cho. "Dr. Schöler is an internationally leading stem cell scientist with high ethical standards. Moreover, we highly appreciate his long-standing dynamic sup-

port for young South Korean scientists in their careers." The new institute will be dedicated to the use of stem cells in regenerative medicine. Scientists especially want to investigate how so-called iPS cells can be used in cell replacement therapy. Since no embryos are required for the production of these cells, they are widely considered ethically acceptable. The first department of the institute will be established by Jeong Beom Kim, who studied for his Ph.D. under Hans Schöler in Münster from 2005 to 2009.



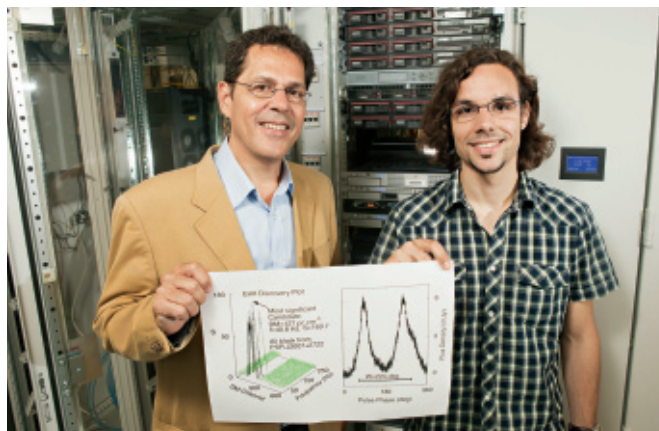
Hans Schöler

A Pulsar in the Screen Saver

A German and an American couple discover a new star with the project Einstein@Home

The family on a mountain hike, a sunset by the beach or a colorful kaleidoscope; when the computer is idle, the screen saver kicks in. The fact that this is something that can be used for serious research has now been demonstrated by music computer scientists Daniel Gebhardt from Mainz and Helen and Chris Colvin from the United States. The three amateur researchers have been participating in the Einstein@Home project – and found the signal of a new pulsar in the data from the Arecibo radio telescope in

Puerto Rico. The collapsed star, 17,000 light years away, is located in the Vulpecula constellation and rotates 41 times per second. The object is clearly



A stellar finding: Max Planck Director Bruce Allen (left) and Ph.D. student Benjamin Knispel are delighted with the discovery of the pulsar.

a recycled pulsar, a neutron star that first acquires mass and momentum from a companion star, which it then loses. However, scientists cannot rule

out the possibility that PSR J2007+2722 is a very young pulsar with an unusually low magnetic field.

The finding published in *SCIENCE EXPRESS* is the first discovery in deep space with Einstein@Home, a community project started in 2005 by the Center for Gravitation and Cosmology at the University of Wisconsin, Milwaukee, and the Max Planck Institute for Gravitational Physics in Hanover. It uses idle computing time volunteered by around 250,000 participants from 192 countries on their home and work

computers. The original purpose of Einstein@Home was to search for gravitational waves, but since 2009 has also included signals from radio pulsars.

High Impact Factor

LIVING REVIEWS IN RELATIVITY ranks second

For the first time ever, the open access journal *LIVING REVIEWS IN RELATIVITY* published by the Max Planck Institute for Gravitational Physics in Potsdam was scientifically ranked. According to "JOURNAL CITATION REPORTS" from Thomson Reuters, the free Internet journal, which was started by Director Bernard Schutz in 1998, ranked second at first go in the category "Physics, Particles & Fields," with an impact factor of 10,600. The Journal Impact Factor is one of the most commonly used tools to assess scientific journals. It allows users to assess the ranking of a journal and its overall scientific importance objectively. The impact factor of a journal is the average number of times published papers are cited up to two years after publication.

On the Net



Max Planck on YouTube

Those interested in scientific films will be pleased to know that the new Max Planck Society video channel boasts more than 40 films in English and German. The channel already has more than 150 subscribers. Besides clips explaining the research at the Max Planck institutes, there are also video podcasts that portray the Max Planck Society as an employer. The channel is aimed at students and doctoral candidates with a passion for science.

<http://www.youtube.com/user/MaxPlanckSociety>

Nuclear fusion as flip book

The electronic flip book "Hot in here!" shows the course of a plasma discharge in Garching's ASDEX Upgrade fusion device basically in real time – everything is over in 10 seconds, just as in the laboratory. Much quicker than the real process is the electronic flip book "Complicated, but highly promising!": The CAD drawings of the construction of Greifswald's Wendelstein 7-X device sum up the individual stages of assembly in fast motion images.

<http://www.ipp.mpg.de/ippcms/eng/pr/publikationen/interaktiv/daumenkino/index.html>