Environmental History
The Tibetan Plateau, which covers some 1.5 million square kilometres, has had a significant influence on the global climate over the past fifty million years. A Sino-German team of researchers is searching for new insights into the far-reaching climate and environmental changes of the past in the sediment of the Nam Co.

Robust Biocoenoses
Because they are able to defy even the most inhospitable of habitats, microalgae are ubiquitous. The algal biocoenoses often appear as a “green skin”. Depending on the humidity of the substrate, the biofilm can vary between being moist and slimy or powdery and dry. Bioscientists are on a quest to better understand how microalgae live and how they adapt to such different environmental conditions.

Funeral Cultures
Changes in religious convictions and ideologies also result in adaptations in burial customs. On the basis of the burial and grave rituals in the United States, researchers have demonstrated that the economic interests of undertakers and funeral parlours play a major role that has so far received little attention.
A decade has passed since the DFG's white paper on “Safe-
guarding Good Scientific Practice” was published – and nine
years since the DFG ombudsman, the independent committee on good sci-
cient practice. This is extremely important that science in Germany enjoys
the promotion of young researchers and scientists, the white paper recommended the installation of the DFG ombudsman and inde-
pendent, local ombudsmen. The enquiries ren of all
primary data for a period of ten years as well as dealing with issues such as authorship and the ever-increasing problem of plagiarism. Other recom-
mandations relate to scientific coop-
eration and leadership responsibility, the promotion of young researchers and the obligation of absolute con-
fidentiality of peer reviews. To fa-
cilitate the implementation of these recommendations, and to provide a source of advice and support to re-
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The DFG's recommendations for ensuring good scientific practice are still current, even ten years after they were published – and yet they have not still really arrived in everyday science

The system of ombudsmen that was subsequently established on the basis of this recommen-
dation reveals the significance of the DFG white paper. Since that time, every researcher and scientist in Ger-
many has been able to turn either to a trusted person at their own institu-
tion or to the DFG ombudsman if they suspect a violation of the rules of good scientific practice. We – here I will ex-
plain the process as we have estab-
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The DFG's ombudsman is the first time that the critical areas that must be more sensitive to the is-


terest, and do everything in our power to implement the recommendations even more consistently and effec-
tively than we have done in the last ten years. Otherwise we expose the risk of ending up in a situation where this system proves to be ineffective.

Ulrike Beisiegel

A Question of Integrity

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tion of the rules, for example by pub-
lishing an erratum if there was a case regarding authorship. These cases are closed by presenting a written statement about the matter to both parties. However, if a serious case of scientific misconduct is suspected, we pass the matter back to the committee at the institution affected. This com-
mittee – also called for by the white paper – then checks the information provided again, to assess whether further measures are required.

The enquiries ren of all the DFG ombudsmen reveal the most serious threats to good scientific practice. Allow me to mention two in particular – along with ideas on how to solve them.

Many queries we receive relate to issues of a lack of leadership responsibility and insufficient promotion of active researchers. This is a matter of particular concern, since it is the quality of young researchers and scientists that determine the future of our scientific system. In spite of excellent programmes established by the DFG and other funding bodies to promote young scientists, we see time and time again that those affected are not-
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ence that they need. Especially in medicine, cases of obstruction in-
stitutes of promotion of re-
search are frequent, due to the clinical work that takes priority. In such cases it is very important to create the necessary structural conditions for good scientific practice to be put into action.

In my opinion, the ever-increasing pressure to perform that exists in the scientific community demands more detailed evaluation of performance. It is simply not fair for the director of an institution to be credited for the number of publications cur-
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Over the past fifty million years, the Tibetan Plateau has had a decisive influence on global climate. In lake sediments collected from Nam Co, German and Chinese researchers search for clues of climate and environmental changes with far-reaching consequences.

The Top of the World as a Climate Sensor

By Antje Schwalb et al.
The scientists experienced a sensation in applied meteorology their very first night: Heavy showers beat down on the tents, which were covered in white monsoon monsoon generally arrives from the southern shore of the lake from the station. After a few days, the work was relocated to a tent camp protected bay near the northern-eastern end of the lake. From here, the work programme could be continued on land and water.

Climate changes in the past and the role of man in shaping environmental history are the focus of the studies in Tibet. The collaboration with the Chinese colleagues was prepared during workshops held in Peking and Lhasa. Anyone who considers China to be an emerging nation will know after a visit that this is no longer true. New laboratories with state-of-the-art equipment demonstrate that the advancement of science has priority in China. The Chinese cooperation partners had also organized the permits for fieldwork and constructed a research station at Nam Co, a 120 square metre structure with laboratory, several rooms, two bedrooms, a kitchen with dining area as well as a latrine. The researchers from Germany were among the first guests who set up their tents there to explore the southern shore of the lake from the station. After a few days, the work was relocated to a tent camp protected bay near the northern-eastern end of the lake. From here, the work programme could be continued on land and water.

A first look at the sediment cores shows a sandy layer, a possible indicator of a low lake level. Any study will determine if the lake level was as large as Lake Constance. Its sediments provide new insight into past climate changes.

Muddy roads. The destination of the German-Chinese project is Nam Co, a saltwater lake on the Tibetan Plateau which is nearly four times as large as Lake Constance. Its sediments provide new insight into past climate changes.

The collaborators from Germany worked in a protected bay near the northern part of Lhasa, approximately 70 kilometres long and nearly four times longer than Lake Constance. Projecting from the southern shore like an alpine wall are the Nyan- pen Tangla mountains, with peaks reaching over 7000 metres. Lake sediments have the great advantage that they store climatic and environmental changes in the lake and its catchment basin in high temporal resolution. Climatic and environmental indicators buried in the lake sediment such as micro-organisms, algae, grains of pollen and micrometre-size rock and plant remnants are like newspapers which, when first laid out, offer a detailed journey into the past. These climatic and environmental indicators are used to search for clues to past changes in monsoon and glacier dynamics into the past.

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When Dead Stars Emit Signals

Cosmic electronic engineering: Pulsars emit more intense radiation than any other object in the universe. Astrophysicists have found confirmation that the laws of nature that apply on earth also hold true at the boundaries of matter.

By Harald Lesch and Axel Jessner

About once every 50 years the Milky Way witnesses a monumental event: the explosion of a star. In much the same way as when a bomb explodes, the outer layers of gas surrounding the star are blown off and expelled into space, illuminating the universe. The star’s inner core, which is about one and a half times as massive as the sun, survives the explosion, but collapses under its own weight. What is left is an intriguing remnant of the old star, consisting of one of the most extreme forms of matter in the universe, which is as dense as an atomic nucleus.

Whereas the exploding gas shell spreads out into space and the radiation it gives off weakens, the corpse of the star that is left behind frequently signals its presence in the universe by emitting very strong pulses of radio waves. Radio astronomers are able to deduce the nature of this corpse from these pulses. They are only a few tens of kilometres across and spin rapidly around their own axis at up to 650 times a second. At the same time they behave like a cosmic lighthouse, emitting very intense radiation – each second they generate as much energy as the entire population of the earth would use in ten billion years.

They are highly-magnetised, filled and surrounded by a magnetic field a trillion times stronger than earth’s. And, what is more, a piece of this material the size of a sugar cube would weigh as much as every person on the planet combined.

They are ambassadors from the very boundaries of perceptible, material reality. If they had been any heavier, they would have fallen entirely victim to their own mass, becoming black holes, from which no radiation can escape.

The objects in question are pulsars, which were discovered in 1967 as pulsing sources of radio waves in space. Even now, most new pulsars are discovered by observations in the radio band. They are among the brightest objects in the Milky Way. In view of their tiny size, the question arises as to why these objects emit such exceptionally intense pulses of radiation in this band of the electromagnetic spectrum and do so with such extreme precision. Their pulses keep time even more accurately than atomic clocks here on earth.

In addition to the remarkable regularity of their radio pulses, they also repeatedly emit bursts of radiation, which, in their most extreme form, can be as brief as just a few bhillions of a second. Multiplying the duration of such a burst of radiation by the speed of light, 300,000 kilometres per second, gives the size of the area from which the radiation emanates. The result is astounding. Radio astronomers have observed areas of radiation that are just a few metres in size, but a quintillion metres (a thousand light years) away from us. Translated into more terrestrial proportions, this would be equivalent to being able to clearly see the nucleus of individual hydrogen atoms in the water on the sea bed at a depth of ten kilometres.

For such minute areas of radiation to be at all visible at such a distance, the radio signals emitted by pulsars need to be extremely strong. There is no other object in space that has the ability to generate such intense radiation. Comparing the radio signals emitted by pulsars to the normal radiation given off by a star is something like comparing the light emitted by a laser to that of a light bulb. The light from a...
light bulb shines in every direction, filling the whole room with a ball of light. The amount of light given off is the sum of all of the individual particles in the filament that are excited. In a laser beam, on the other hand, the light given off is concentrated within a very small area. Inside a laser, a large number of electrons are forced to give off precisely the same amount of energy simultaneously by means of technical trickery. The power of a laser is thus proportional to the square of the number of particles excited.

Precise calculations have shown that the radio waves have to be “coherent”. This means that, in terms of their spatial and temporal propagation, the electromagnetic waves all share a fixed phase relationship that is constant over time. This enables them to overlap, allowing them to reach very high intensities. For coherent radiation to come about, it is necessary for as many particles as possible to emit the same amount of energy simultaneously. Researchers assume that pulsars are surrounded by a magnetic field that is anchored to the surface of the rotating pulsar and resembles that of a normal bar magnet. As we all learned at school, the motion of a magnetic field generates electric fields. This is just the same in the case of a pulsar, where the rotation of the magnetic field also generates an electric field. Except that here, the magnetic field is so strong that the field strength of the electric fields generated is so great that they rip charged particles out of the pulsar surface. These particles are then only able to move along the lines of the magnetic field, meaning that there is a constant stream of electrically charged particles originating from the pulsar, which flows out into space along the pulsar’s magnetic field. These are the particles that give off the high intensity radio signals, but how?

Let’s come back to the laser. Here we have a source of coherent radiation in timber and nails. The light bulb is a terrestrial source of coherent radiation, whereas the light bulb is a terrestrial source of coherent radiation. The amount of light given off is simply the sum of all of the individual particles in the filament that are excited. The fresh particles, in other words the newly excited electrons, that come off the filament provide just the same in the case of a pulsar. However, there is an uninterrupted flow of new particles coming from the pulsar, constantly moving back and forth along the field lines, because the strongest source of current is, of course, the surface of the pulsar itself. It is concentrated in the “squeezing” of the magnetic field, and thus electrical current, out to the perimeter of the magnetic field, and there are fluctuations in density along the magnetic field lines. The particles are “rocked to and fro” as they flow away from the pulsar. The strength of the current depends on the number of particles moving and the speed at which they are moving. The maximum speed at which the particles can move, however, is the speed of light. Even the particles emitted from a pulsar cannot travel faster than the speed of light. This soon results in “particle jams” along the magnetic field lines, because all of the particles carry the same electrical charge. Many of them are even reflected and hurtle back towards the pulsar again. However, there is an uninterrupted flow of new particles coming from the pulsar, constantly moving back and forth along the field lines, because the strongest source of current is, of course, the surface of the pulsar itself. It is concentrated in the “squeezing” of the magnetic field, and thus electrical current, out to the perimeter of the magnetic field, and there are fluctuations in density along the magnetic field lines. The particles are “rocked to and fro” as they flow away from the pulsar.

Authors: Prof. Harald Lesch is a Professor of Theoretical Astrophysics at the LMU in Munich; in 2005 he was awarded the Communicator Award by the DFG and the Donors’ Association for the Promotion of Science and Humanities in Germany. Dr. Axel Jessner works at the Max Planck Institute for Radio Astronomy in Bonn.

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Algebraic topology: Leibniz Prize winner Wolfgang Lück is studying fundamental problems that are even too theoretical for some mathematicians

By Rembert Unterstell

In conversation he is relaxed, communicative and friendly. Dressed casually in jeans and a sporty sweatshirt, he is nothing like you might expect a dotty and potentially quixotic mathematician to be. Professor Wolfgang Lück, the winner of the Leibniz Prize 2008, comes across as being down to earth and is very adept at speaking about his work on theoretical mathematics, with a keen sense for how to make it approachable with graphic examples.

The interview with him is so captivating that I am not even tempted to look out of the fifth-floor window of his office at the Münster Institute of Mathematics and admire the roofs of the beautiful cathedral city. He enjoys admiring the panoramic view from his desk once in a while, as he points out, but in general he does not have much time for relaxing these days.

The Leibniz Prize, which he describes as “a great accolade and recognition, but also an obligation”, the stakes in him being in great demand for interviews, as a peer reviewer and, last but not least, as a cooperation partner for research projects. And then there is the “Year of Mathematics 2008”. As the Vice President of the German Association of Mathematicians (DMV), Lück is a coorganiser of the “Year of Mathematics”, an initiative of the Deutsche Telekom Foundation. In Münster his plans include a “Night of Mathematics” through local schools, with the national support of the German Mathematical Society and the general public.

His research focuses on the field of algebraic topology or, put simply, the study of geometric shapes. It attempts to describe complete geometric structures on the basis of just a few points. “Take the universe, for example”, Lück says, “we are all in it and unable to look at it from the outside, but would nevertheless like to know what shape it is.” Topologists study the properties of objects which they possess regardless of their size or proportions. These properties are known as “invariants”. They allow mathematicians to comprehend topological spaces.

Lück’s research is far from being an enclosed thought construct – algebraic topology is just as much a fundamental theory as it is emissive – fascinated me”, Lück stresses. And he adds, in an unpretentious tone, “I am very happy to have found a subject that I am passionately interested in and that I like – and which apparently likes me too.”

Lück was presented with the Max Planck Research Prize for his groundbreaking research in the king’s discipline of mathematics in 2003. Wolfgang Lück was born in Hamburg in 1957. His interest in mathematical problems started at an early age, although it was not unravelled initially. At secondary school his sole passion was football (“for years I fancied the idea of a career in football”), but then his extraordinary talent for mathematics reared its head when, at the age of 15, he won a national mathematics competition. After this encouragement that changed the course of my life” he went on to study mathematics and physics in Göttingen, where he proceeded to obtain his doctorate in 1984 and later qualified as a university lecturer in 1986. At the age of 33 he became an Associate Professor and subsequently took up a tenure track position at the University of Kentucky, Lexington, USA, before returning to Germany in 1991 to take up a chair at the University of Münster, conducting research and teaching.

“Night of Mathematics” as well as entertaining films and workshops. Lück is sure of one thing, “mathematics is far more necessary nowadays than many people are aware, be it in MP3 players, computers or CT scanners”. And, he adds, “if we manage to keep up the innovations that have been kicked off now going on beyond 2008, then we stand a real chance of improving the negative, one-sided image of mathematics in the long term. After all, maths is a very versatile subject that can be fun.”

Discussion at the electron microscope: Professor Knut Urban (centre) analyses the image of a specimen together with members of his group.

The Long Road to Visible Atoms

For centuries, physicists and engineers have been battling image aberration in microscopes. With high resolution transmission electron microscopes they have minimised the flaws yet further – allowing the progress of research and technology to continue

By Knut Urban

At first, the view provided by microscopes was a mere curiosity. When the first microscopes came out, they were presented at fairs, where they attracted great public interest. But researchers were also enthusiastic at an early stage about the potential of the first primitive light microscopes, which appeared in the early 17th century. Demand from the scientific community for more powerful microscopes grew rapidly and spurred on a constant stream of new developments. But the road to today’s modern, high resolution electron microscopes was a long one – and inextricably linked to the solution of some fundamental questions in physics.

One of the milestones on the way to high-resolution optics, with its aberration-corrected lens systems, which enable the sharply focused images delivered by research microscopes and by state-of-the-art digital cameras, was an invention by the physicist and optician Ernst Abbe (1840–1905). By carefully combining convex and concave lenses, so that single lens imperfections compensated each other, the path was cleared for the development of a microscope lens that surpassed everything that had gone before.

This followed the insight by Isaac Newton, and subsequently Carl Friedrich Gauss, that imperfections were physically inevitable using spherical lenses. The two main forms of lens imperfections are spherical and chromatic aberration. Spherical aberration causes a lens to have a greater refracting power, and thus a shorter focal length, for
rays of light that have a large angle of incidence and pass through the edge of the lens, then for rays that have a small angle of incidence and pass through the centre of the lens. As a result, a sharply focused image of a point source in an illuminated object is produced in the image plane by rays of light that are close to the lens axis, whereas blurred, overlapping images are formed by rays that pass through the edge of the lens.

The obvious solution would be to place an aperture between the object and the lens to stop the rays at the edge. But this improvement in the image quality is achieved at the price of poorer resolution. Due to the refracting power that depends on colour, in other words on the wavelength of the light, chromatic aberration also causes the lens to have different focal lengths, and consequently leads to an overlapping of focused and blurred images.

In the early 1930s, Ernst Ruska and Max Knoll became the first to successfully construct a correction microscope. The lenses they used for the electron rays were ring-shaped magnetic fields created using currents that were passed through an electric current was passed. From the wavelength of the electrons, the two researchers were able to work out that it should be at least theoretically possible to image the atomic structure of solid state materials. However, their lenses had such a high rate of imperfections that it was impossible to even conceive of actually realising the goal of atomic resolution electron microscopy.

In fact, it was more than 60 years before a way of constructing aberration-corrected electron lenses was discovered. The reason it took so long to develop state-of-the-art high-performance electron microscopy is that while it is possible to make convex lenses using cylindrical magnetic fields, concave lenses cannot be made the same way. This seemed to mean that the solution proposed by Abbe, which had proven so successful for light optics, was excluded for electron optics. Indeed, in the late 1980s a panel of experts in the USA concluded that aberration correction in electron optics was not the way to achieve higher resolution. At around the same time, however, three German physicists, Harald Rose from the Technical University of Darmstadt, Maximilian Haider from the European Molecular Biology Laboratory and Knut Urban from the Research Centre Jülich set about the task of doing just that. Shortly beforehand, Rose had managed to work out how to build a concave lens that would theoretically be able to correct the spherical aberration of the objective lens in an electron microscope.

Haider’s group in Heidelberg went on to actually build and successfully test such a correction lens. This lens was installed in a commercial microscope which had an electron source that generated electrons with such a low energy distribution that it was possible to do without any additional chromat-ic correction. The first images produced using this microscope were heralded as a sensation. Although the breakthrough had been made, there were several more years of hard work ahead before the world’s first aberration-corrected transmission electron microscope could be put into operation at the Research Centre Jülich in the year 2000.

So what is the principle behind this state-of-the-art method of electron microscopy? Many people think that it must be similar to light microscopy, where the details of a specimen are visualised by shining light through it, and that the local absorption of electrons is stronger or weaker, resulting in an image consisting of light and dark areas.

In fact, none of the electrons are actually absorbed. The interactions between the electrons and the atoms are far more complex and can only be described by quantum physics. The waves of electrons undergo a phase rotation in the electric field surrounding the atoms. This is easiest to imagine as being like the hand of a clock turning. The closer the electrons are to the atomic cores, the faster the hand turns. Since these phase rotations cannot be observed directly, it is necessary to convert this “phase contrast” into a visible image of light and dark contrast. This is achieved by defocusing the objective lens by a set amount. Because this deviation from the ideal focus results in a loss of image focus it is necessary to arrive at a compromise between contrast and resolution. This was calculated more than 60 years ago by the theoretical physicist Otto Scherzer, and the focus conditions named after Scherzer have remained the standard in high-resolution electron microscopy ever since.

Even during the first few months that the new electron microscope was in use at Jülich, it was clear that a new era had dawned for what had come to be known as phase contrast microscopy. This was thanks to the discovery of a new, previously unthought-of imaging method, which involves setting the correction lens in such a way that the aberration of the objective lens is overcompensated by a few percent, so that it becomes slightly negative. This setting not only allows a significantly higher resolution than in classical Scherzer mode, but also makes it possible to increase the contrast so much that it is possible to image atoms, such as oxygen, which only scatter the electrons weakly because of their low atomic number. In 2005, the first commercial transmission electron microscopes, put up for sale at costs between three and four million euros, came onto the market. In the light of this, the Research Centre Jülich and the RWTH University Aachen established the Ernst Ruska Centre for Microscopy and Spectroscopy with Electrons. Based in Jülich, it is the first user centre for ultra-high resolution electron microscopy in Germany. It currently operates two new latest generation transmission electron microscopes, which went into service in early 2007. These research microscopes are available for use by German researchers. At present, the most remarkable results being achieved by the high-performance electron optics are in the investigation of oxides, one of the largest classes of materials. It is now possible, for the first time, to see the most important element for the oxide properties of these compounds—oxygen, at high resolution and at a scale of just a few hundredths of the inter-atomic distance. This puts our progress into perspective: regard-less how incomparably small these dimensions may seem, they determine the properties that materials have at the macroscopic scale.

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The Secret of the Green Skin

They are everywhere: Microalgae colonise house walls, soil and trees. Even inhospitable environments hardly bother these algal communities. The way in which biofilms protect themselves and constantly adapt to their habitat is also of interest to basic researchers.

By U. Karsten, R. Schumann, L. Gustavs and Th. Friedl

If you look carefully as you walk through a recently built or redeveloped area, you’ll often see that the walls and roofs of the buildings are speckled with some kind of green substance. What is this green coating that seems to get everywhere? It has, in fact, a lot to do with the insulation of buildings, which is often implemented as an additional façade of insulating boards covering the walls in compliance with new energy efficiency legislation. This method of insulation, however, often results in the formation of “green skin” on building facades after a few years. In many towns, it has been observed that up to 80 percent of the buildings with external wall insulation are affected by this troublesome greening.

A look through the microscope reveals the culprit responsible for these green blotches. They are primarily caused by single-cell microalgae belonging to a variety of different taxonomic units. Microalgae are lower plants that are just a few thousandths of a millimetre large and typically occur as phytoplankton in the oceans and other aquatic environments. There, the aquatic microalgae play a crucial role in fixing carbon dioxide and producing oxygen. A perhaps astonishing fact is that half of all the oxygen present in the earth’s atmosphere was produced by algae. The high-value substances they contain and the low cost of cultivating them make microalgae a potentially interesting source of raw materials.

Microalgae can also be found far from the water in manmade habitats, not only on building facades, but also on transformer stations, road signs, lamp posts, and a multitude of other locations that appear, at first sight, to be devoid of the water that the algae need to survive. They also occur in the soil, on the bark of trees and on stones, where...
they form so-called biofilms that are typically blue-green to black, and occasionally reddish-brown. Depending on the amount of moisture on the surface they inhabit, referred to as the substrate, the algae communities have a consistency that ranges from damp and slimy to powdery and dusty. These organisms, which are described as "aeroterrestrial", actually live at the interface between the substrate and the air.

The microalgae responsible for turning buildings green are probably present all around us in the atmosphere as "aeroplankton". They are either blown on the wind or carried in the rain. The initial growth often consists of algae with a thin layer of mucous that enables them to stick to even the smoothest of surfaces and stay there. These pioneers then make it easier for other new arrivals to colonise the substrate, forming a community in the biofilm that provides protection against drying out or the effects of bright sunshine.

Most of these green algae have only a few morphological characteristics. The fact that these organisms have such a uniform appearance may be interpreted as a way of adapting to the specific locations they colonise. Perhaps there are only a few structures (ball shaped, thick cell walls) that are suited to survival in biofilms, which frequently dry out. These similar structures seem to have evolved completely independently in entirely different lines of green algae, as has been revealed by molecular genetic studies. The biodiversity that has been shown to exist by molecular genetic studies is thus far greater than was initially assumed, although it certainly one of the key ecological factors governing microalgal colonisation. In addition, the growth of algae in this part of the world is favoured by climatic factors such as mild winters with fewer days of frost and higher levels of rainfall during the main growth periods in the spring and summer.

Nevertheless, the green algae have adapted especially well to the environmental conditions on the surfaces of buildings, which are comparatively extreme. For instance, the spores soon germinate and the algae deal with the frequent dry periods by forming dry spores. From the plentiful drops left by rain showers to prolonged periods of complete dryness. Furthermore, in this climate, the temperature differences between day and night can be up to 15°C. In the period of roof tiles can fluctuate by more than 50°C in the summer.

The algae deal with the frequent dry periods by forming extremely thick cell walls or layers of mucus that are intended to provide protection against loss of water through evaporation. Speres form during long periods of drought. They are characterised by their thick, impregnated cell walls, which allow them to survive for many years in a dry environment. As soon as they come into contact with water, the spores soon germinate and begin to grow again.

In addition to having these external protective structures, ecophysiological studies have shown that the aeroterrestrial algae have more algal growth. This phenomenon is due to microclimatic conditions, such as humidity and intensity of the sunlight a wall is exposed to. On walls with addition-

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Between Two Different Worlds

A visit to the DFG’s Office in Delhi

By Magdalena Schaeffer

Welcomed by an elephant: When German Chancellor Angela Merkel visited Delhi in October 2007, the DFG drew her attention in a typically Indian manner: a large elephant! In addition to the DFG a number of other German research funding organisations are at home in the German House. The close proximity benefits everyone.

of the conference. Almost all of the Indian professors present had spent at least a year or more living and researching in Germany with a Humboldt fellowship, and one had even qualified as a university lecturer and started a family while living in Germany. The Indians are also very familiar with some typical German traits, for instance their tendency to be very precise and speak their mind.

The Germans at the conference are rather in familiar with Indian research and culture. For example, that evening they show very little restraint while waiting for the buffet to open, eagerly sampling the start- ers, so that by the time the buffet is finally opened they are all almost full up already. The obvious Indian desire to make conversation before supper and leave promptly afterwards. It would be wise not to stay on after the meal.

All in all the chemists are very successful at connecting with each other. At the conference in Kanpur plans are made for future projects. Chemicals, travelling visit-s, and Gernot Gad is in high demand. Most of the resulting re- search collaboration is taking place in Germany, however, which is not least due to the German doctoral students, very few of whom are in- terested in spending part of their degree studying in India. Instead, connecting with Indian students, leaving them faced with the difficult job of selecting suc- cessful applicants. Gad and his staff take care of them and providing wisdom, patience and flexibility! As well as that, the team in Delhi has received a number of Ger- man and Indian science delegations, taking care of them and providing with advice and information. The DFG also hopes that a project being run in Delhi by the Lindau alumni group, which aims to get In- dian schoolchildren interested in a career in science, will have a broad impact on the next generation. It may seem hard to believe, but despite its immense population, India is suffer- ing a shortage of young scientists, as rising salaries in industry attract the best minds away from academia.

All this has been achieved by the DFG staff in India with the support of the DFG Head Office in Bonn. From Germany it is hard to imagine how time-consuming and nerve-wracking even seemingly trivial things can be. The instructions given on an invoice or buying a train ticket are anything but trivial in India, and the native speakers employed at the office are absolutely essential, because using English all too frequently leads to misunderstandings. But the Delhi team is well equipped with the most important things that you need in In- dia, plenty of patience and flexibility!}

On tour with german research
Religious rituals are assumed to be long lasting and all but unchangeable. Yet funeral culture in the United States shows that they are actually in constant flux – especially due to commercial reasons.

By Oliver Krüger
that causes rituals to change – for example when it comes to the culture of public mourning and funerals? This question may sound surprising to religious ears. From a religious point of view it is often claimed that rituals have changed very little throughout the centuries. However, recent cultural studies from sociology to comparative religion, demonstrate that rituals are constantly undergoing a dynamic process of adaptation to social and cultural change. The obvious shifts in Germany’s funeral culture – as exemplified by natural burials in forest cemeteries or the trend towards anonymous inurnments – graphically illustrate this finding. Ritual research used to largely ignore economic factors as drivers of change. The underlying reason can be found in Christianity’s taboo on the material aspects of rituals, especially when it comes to funerals. After all, burying the dead is the “seventh act of charity” according to Christian doctrine. This two-fold taboo makes the highly commercialised mortuary culture in the United States an intriguing topic, which also brings the economic interests of the funeral industry into view.

Funeral and grave culture in the United States, in spite of the country’s religious diversity, was quite homogenous over a long period. Only recently did things begin to change. The “average” American funeral, for Christians as well as non-Christians, is the interment of the body. But the share of cremations in the US, which was only 2.7 percent in 1961, is now as high as 31 percent (2004). Over 90 percent of burials and even 25 percent of cremations currently involve the American tradition of embalming and cosmetically preparing the entire corpse.

After the embalming, the deceased is dressed in festive clothes, from underwear and shoes to a fine dress or suit, made by specialised fashion houses. Then the body is laid out, usually in a funeral home, for several hours (up to three days) for several hours (up to three days) for several hours (up to three days) for several hours (up to three days) for several hours (up to three days) for several hours (up to three days) for several hours (up to three days) for several hours (up to three days) for several hours (up to three days) for several hours (up to three days) for several hours (up to three days) for several hours (up to three days) for several hours (up to three days) for several hours (up to three days) for several hours (up to three days) for several hours (up to three days) for several hours (up to three days) for several hours (up to three days) for several hours (up to three days) for several hours (up to three days) for several hours (up to three days) for several hours (up to three days) for several hours (up to three days) for several hours (up to three days) for several hours (up to three days) for several hours (up 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In many cases, memorial societies grew out of religious lay movements, particularly on the Protestant side, but they also have roots in the union and labour movement. During that period, a major emphasis was placed on popularizing cremation. The reform movement gained momentum when civil rights activist Jessica Mitford (1917–1996) caused a stir with her book “The American Way of Death” (1963), in which she revealed the sales strategies employed by the funeral industry, and bluntly described the preparation techniques used in embalming.

Suddenly, funerals became a political issue. The American Intelligence Service, a private organisation devoted to the relentless fight against “un-American activities”, disseminated pamphlets and brochures that warned of memorial societies. They condemned advocacy of cremation and criticism of American funeral directors as mere communist propaganda to undermine the traditions, values, and moral community of Americans. Nonetheless, the representatives of memorial societies were ultimately able to push through comprehensive consumer protection legislation, the Funeral Trade Rule of 1984. It made it illegal, for example, for funeral directors to tell their customers that embalming and inhumation are required by law. Since that time, legal aid services have been available, and numerous test cases involving violations of the Funeral Trade Rule have been brought before the courts.

But in addition to educating consumers and issuing recommendations for legitimate funeral directors, some local FCA chapters have entered agreements with select undertakers to obtain discounts. There is much controversy within the movement whether its mission should be to secure benefits for members or to campaign for a more equitable and transparent funeral culture in general.

The new legal framework that was ultimately created by the various parties made it possible for America’s funeral culture to become more diverse toward the end of the 20th century. Cremation has become a popular alternative to traditional burial funerals with embalming and viewing. In addition, more people choose alternative funeral forms, such as home burials and green burials – all of which indicates a ritual culture in flux.
The Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) is the central self-governing organisation responsible for promoting research in Germany. According to its statutes, the DFG serves all branches of science and the humanities. The DFG supports and coordinates research projects in all scientific disciplines, in particular in the areas of basic and applied research. Particular attention is paid to promoting young researchers. Researchers who work at a university or research institution in Germany are eligible to apply for DFG funding. Proposals will be peer reviewed. The final assessment will be carried out by review boards, the members of which are elected by researchers in Germany in their individual subject areas every four years.

The DFG distinguishes between the following programmes for research funding: In the Individual Grants Programme, any researcher can apply for financial assistance for an individual research project. Priority Programmes allow researchers from various research institutions and laboratories to cooperate within the framework of a set topic or project for a defined period of time, each working at his/her respective research institution. A Research Unit is a longer-term collaboration between several researchers who generally work together on a research topic at a single location. In Central Research Facilities there is a particular concentration of personnel and equipment that is required to provide scientific and technical services.

Collaborative Research Centres are long-term university research centres in which scientists and academics pursue ambitious joint interdisciplinary research undertakings. They are generally established for a period of twelve years. In addition to the Classic Collaborative Research Centres, which are concentrated at one location and open to all subject areas, the DFG also offers several programme variations. Transregional Collaborative Research Centres allow various locations to cooperate on one topical focus. Cultural Studies Research Centres are designed to support the transition in the humanities to an integrated cultural studies paradigm. Transregional Units serve to transfer the findings of basic research produced by Collaborative Research Centres into the realm of practical application by promoting cooperation between research institutions and users. DFG Research Centres are an important strategic funding instrument. They concentrate scientific research competence in particularly innovative fields and create temporary, internationally viable research priorities at research universities.

Research Training Groups are university training programmes established for a specific time period to support young researchers by actively involving them in research work. This focuses on a coherent, topically defined, research and study programme. Research Training Groups are designed to promote the early independence of doctoral students and intensify international exchange. They are open to international participants. In International Research Training Groups, a jointly structured doctoral programme is offered by German and foreign universities. Other funding opportunities for qualified young researchers are offered by the Heisenberg Programme and the Emmy Noether Programme.

The Excellence Initiative aims to promote top-level research and improve the quality of German universities and research institutions in the long term. Funding is provided for graduate schools, clusters of excellence and institutional strategies.

The DFG also funds and initiates measures to promote scientific libraries, equips computer centres with computing power, provides instrumentation for research purposes and conducts peer reviews on proposals for scientific instrumentation. On an international level, the DFG has assumed the role of Scientific Representative to international organisations, coordinates and funds the German contribution towards large-scale international research programmes, and supports international scientific relations.

Another important role of the DFG is to provide policy advice to parlaments and public authorities on scientific issues. A large number of expert commissions and committees provide the scientific background for the passing of new legislation, primarily in the areas of environmental protection and health care.

The legal status of the DFG is that of an association under private law. Its member organisations include research universities, major non-university research institutions, such as the Max Planck Society, the Fraunhofer Society and the Leibniz Association, the Academies of Sciences and Humanities and a number of scientific associations. In order to meet its responsibilities, the DFG receives funding from the German federal government and the federal states, as well as an annual contribution from the Bonn-based DFG Research Centres for the Promotion of Sciences and Humanities in Germany.