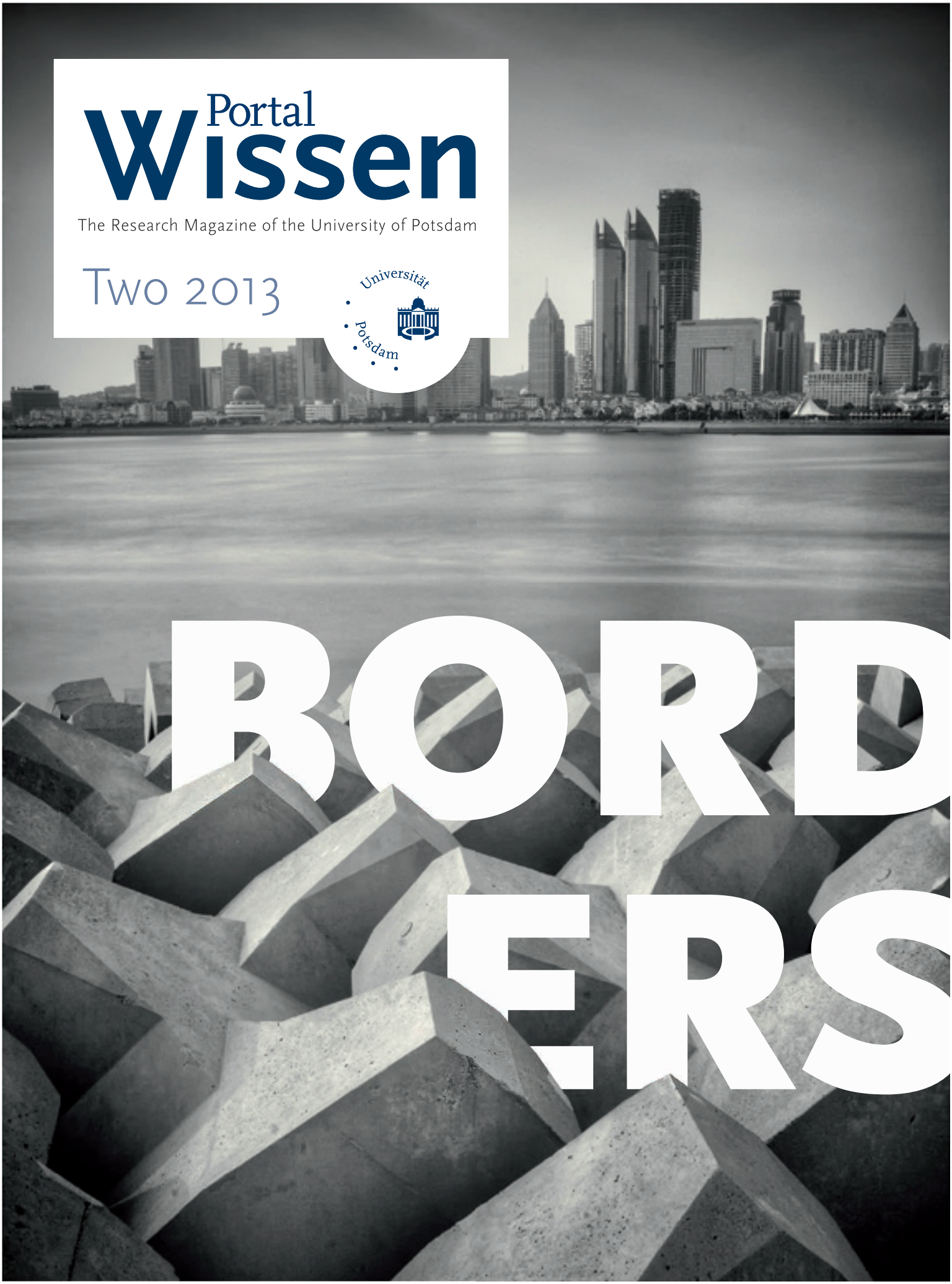
Portal Wissen

The Research Magazine of the University of Potsdam

Two 2013

Universität Potsdam



The Photographer of “Borders”

The cover photo and the pictures introducing the five themed sections of the magazine were taken by Dr. Stephan Opitz.

From my photographic perspective, “Borders” are of great significance for an excellent picture. By defining an image area, the photographer provides a certain frame for the viewer, which can be of extreme importance for the effect of a picture. On the other hand, “Borders” as a photographic motive may contribute to the image structure in many ways. For example, the horizon as a natural border separates the sky from the rest of the picture. The photographer can make smart use of this “Border” to give certain emphasis to specific elements of the picture. However, there are also ethical limits in photography, like, for example, documentary photography in conflict areas. This is a very sensitive genre and the photographer has always to find the balance between objective reporting and voyeurism.

To me, black and white photography is just the ideal form of photography. You can often achieve a much more intensive effect with shades of grey and contrasts than with colors, because color can easily distract you from the essential.

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THE SCIENTIST

Dr. Stephan Opitz studied geology in Potsdam and did his PhD on Late Glacial to Holocene paleoenvironment on the northeastern Tibetan Plateau inferred from lake sediments. In his postdoc phase, he is now working on a project dealing with the reconstruction of water availability in the Near East.
An autodidact in photography, he has taken photos for about six years and mainly concentrates on black and white photography. He has successfully taken part in several competitions and some of his pictures have already been at exhibitions in Potsdam.

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Dear Readers,

The new edition of the Potsdam Research Magazine "Portal Wissen" approaches the subject "Borders" from different perspectives.

As a linguist, this headline makes me think of linguistic borders and the effects that might result from the contact of two languages at a particular border. There is, for instance, ample evidence of code-switching, i.e. the use of material from at least two languages in a single utterance. The reasons for code-switching can be manifold. On the one hand, code-switching may result from a limited language competence, for example if a speaker lacks a particular word in a non-native language. On the other hand, code-switching may be a matter of prestige if the speaker wants to demonstrate his or her affiliation to a certain social group by switching languages. If code-switching does not only occur sporadically but involves whole language communities over a longer period of time, it can result in significant changes of the involved languages. Which language "gives" and which one "takes" is determined by sociolinguistic factors. It is, hence, quite easy to predict that German varieties spoken in language islands in South and Eastern Europe as well as in North and Latin America will absorb more and more language material from their neighbouring languages until they disappear unless political will strives to preserve these language varieties. Increasing mobility of modern societies has multiplied the extent and the intensity of language contact and certainly comprises a large number of different contact situations besides the one most commonly known, i.e. the contact between German and English. From a historic point of view, German witnesses a strong influence of various Romance languages such as Latin, French and Italian. In Potsdam, one cannot help being reminded of the French influence during the 18th century.

Overcoming language borders becomes also apparent in the everyday life of an international research university. In March this year, the Annual Conference of the German Linguistic Society took place in Potsdam, with more than 500 participants. Lingua franca of this conference was English. Compared to previous conferences, this further increased the number of international participants.

The articles in this edition illustrate various approaches to the topic "Borders": On the trail of "Boundary Surveys", we follow the Australian explorer Ludwig Leichhardt. "Travellers Across Borders" is focussed on articles dealing with the literature of the colonial Caribbean or with the work of an Italian geologist deep beneath the earth's surface, for example. Looking for the "Boundless", our authors follow scientists who discuss questions like "Why love hurts?". The present issue of "Portal Wissen" also takes into account "Drawing Up Borders" in an article that is concerned with the limits of work-related stress. Instances of successful "Border Crossing" are provided by the "Handkerchief Lab" as well as by new biotechnological applications.

I would like to wish you inspiring border experiences, hoping that you will get many impulses for crossing professional borders in your field of expertise.

PROFESSOR ULRIKE DEMSKE
PROFESSOR OF THE HISTORY AND THE VARIETIES OF THE GERMAN LANGUAGE, VICE PRESIDENT INTERNATIONAL AFFAIRS, ALUMNI AND FUNDRAISING

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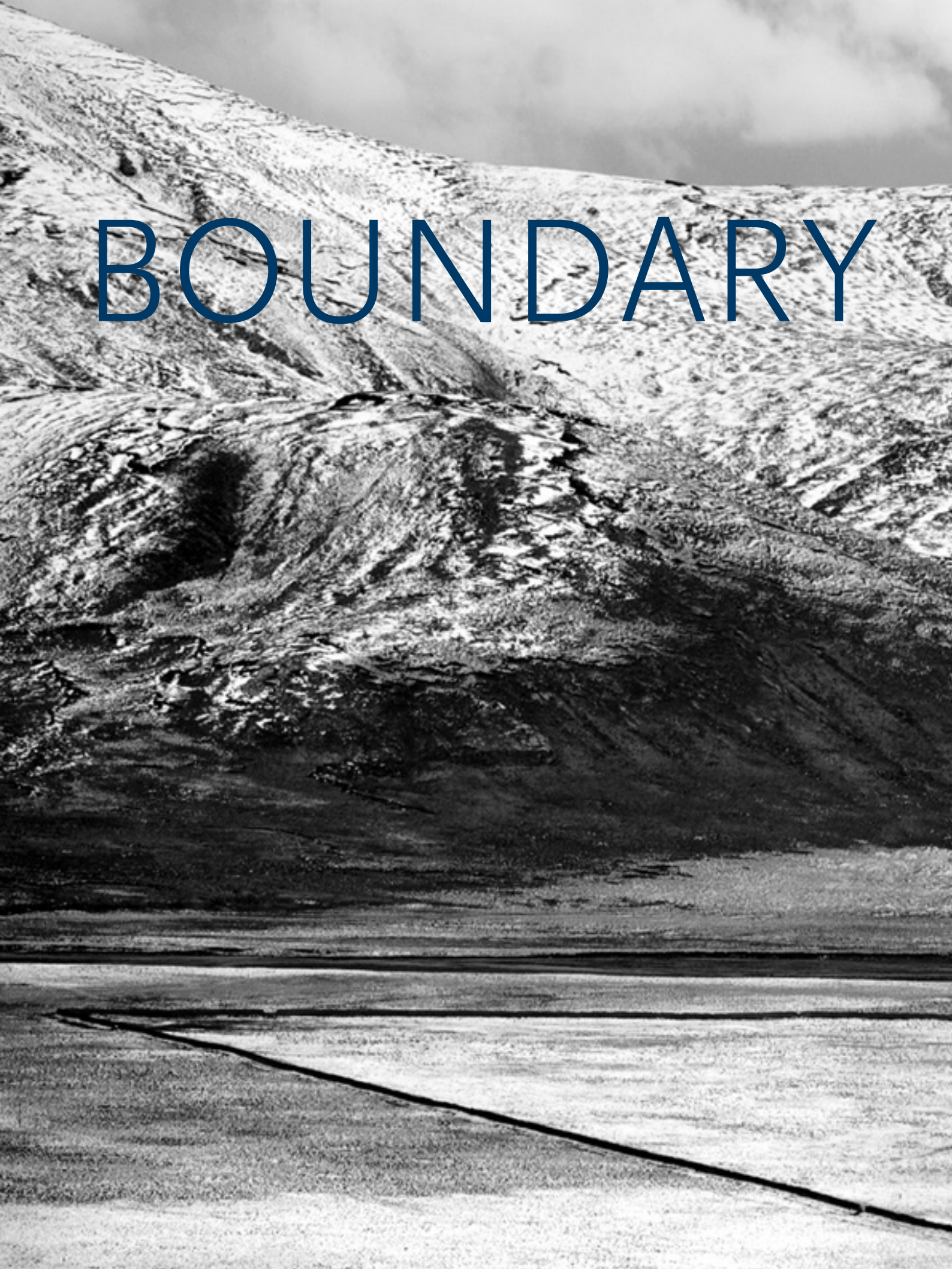
BOUNDARY

Surveys

Grenzvermessung

“Moras” and the Sitting Goddess

Mineralogists With Mobile Raman Probe in Museum

The sitting goddess from Mesopotamia has already some four thousand years under her belt. Secured by an alarm system and guarded by museum attendants in uniform, the statue resides behind glass in the Berlin Pergamon Museum. This is not really the classical working environment for a mineralogist. Even so Martin Ziemann, senior scientist at the Institute of Earth and Environmental Science of the University of Potsdam did not come to the museum as a visitor but as a researcher.

Ziemann wants to examine whether the white alabaster figurine, which is the size of a fist, was once colorfully painted although hints for it cannot be seen with the naked eye. The research scientist works with Raman spectroscopy, a method widely used in mineralogy and archaeometry, to detect even micrometer-sized pigment particles or binders. Since he cannot take such fragile, valuable objects like the little goddess to the laboratory of the institute, not to mention mural paintings or permanently installed large sculptures, he has designed mobile equipment that can actually be used at any location.

"Mobile", however, is a relative term here. The complete equipment is safely packed in aluminium boxes and cases and weighs about 130 kg. It took the lorry two hours to bring the equipment from Potsdam-Golm to the Museum Island in the center of Berlin. There it will be used for the first time outside the institute. The instruments are stacked now in a windowless adjacent room of the Vorderasiatisches Museum. The core piece of the installation – the spectrometer – is placed in a flat box not much bigger than a packing case. Ziemann and his student assistant Fritz Falkenau fix the probe head at the tripod so that it extends over the worktable and connect it to the spectrometer with metal-shielded fibre-optic cables. Then they focus the laser beam on the monitor screen.

Raman spectroscopy is one of the few methods to examine ancient finds in a non-destructive and contactless way. A relatively weak laser beam is focussed to approximately ten thousandths of a millimeter and directed at a spot where the experts presume pigment traces. Even if there are only tiny residues, they emit a light response with a pattern characteristic for the respective substance. The jagged line on the computer screen, Raman spectrum, is like a fingerprint. Similar to detectives comparing the culprit with their criminal records, scientists can compare their measured spectra with relevant databases and identify the substance. Artist in ancient Mesopotamia certainly knew black, white, and red pigments from clay mineral, limes, and iron compounds. Other colors were used at a later point. The spectrometer can also identify other products that result from the aging process of these substances and environmental conditions.

"The Raman spectrum is like a fingerprint."

Dr. Martin Ziemann (left) with the mobile Raman probe "Moras" in the Vorderasiatisches Museum, the Museum of the Ancient Near East.

First the instrument has to be calibrated with a silicon specimen. Then the scientists can start. The entrances to the room with the sitting goddess are barred and watched by guards. Ralf-Bernhard Wartke, Vice Director of the Vorderasiatisches Museum, opens the glass cabinet with white gloves and takes out the figurine. He carries it carefully to the adjacent room which has been changed into a temporary laboratory. There he beds it into a grey plastic container, on something that looks like sand. "Granulated walnut shells," Ziemann explains. The figurine rests firmly on this substance and can be still moved quite easily. Sand could possibly wear the surface.

"Uneven spots somehow enable us to look into the material."

The art historian says goodbye until the evening. The actual work for the mineralogists begins. The goddess gets the sample number VA 4854. Using an optical microscope, Ziemann looks for a slightly worn out spot on its smooth surface. "Such uneven spots enable us to look into the material, so to speak." He has chosen this spot according to a catalogue of the archaeologist Astrid Nunn of the University of Würzburg that she compiled during her research project "Polychromy of Mesopotamian Stone Statues". It contains a number of objects that proved to be "suspicious". Nunn's research team took photos of them and marked possible places where pigment residues might be found.

How did this quite unusual interdisciplinary collaboration come about? Martin Ziemann smiles, "I always wanted to work in the neighbourhood of the university, too, preferably on something that also interests the people here." This is how he met restorers of medieval mural paintings in Brandenburg, in Ziesar and Herzberg. They wanted to know how environmental conditions can influence the condition of pigments. For analyses in the lab they had to take tiny samples, however. The experience gained from these analyses Ziemann wanted to use on Buddhist mural paintings from Central Asia in the Berlin Museum of Asian Art. Then he came up with the idea of a spectrometer that could be taken to the objects. Out of different components that are usually meant for other purposes, a base with wheels, a camera tripod, and an extendable beam, he had a kind of crane built in two different sizes. The detector head is tightened to the beam and can be brought to mural paintings or big sculptures in any position, even from below to frescoes on the ceiling. The smaller model can get to a height of about three meters and the bigger one even to six meters with a boom length of eight meters.

Would you like a demonstration? It takes Ziemann and his student assistant about ten minutes to assemble the little crane. It just fits through the door of the adjoining room. The two men roll it carefully, anxious not to knock against anything, to a section of a firmly built-in façade section with a colored lining. In this section, a number of human figures made of clay are embedded in a relief-like way. It comes from the Mesopotamian metropolis Uruk, from the "Inanna Temple of Kara-Indasch", as the plate next to it tells us. Construction year: about 1413 BC. Just a few simple adjustments are necessary to place the instrument exactly at the desired position.

But now it is time for the goddess. Despite sophisticated technology the examination is not easy. After all, Ziemann finds the "suspicious" spot marked by the archaeologists quite quickly. "We do not always manage it." The actual measurement takes several accumulations until you can filter out the "real signals" from the "background noise". But even these remain strangely unfocussed. Ziemann thinks that the figurine got a very thin, protective coating of resin or wax someday. At least they do not discover any indications of former painting. The assumption of the research team from Würzburg has not been confirmed in this case. Ziemann will not run out of objects for his examinations. There is a great demand. At least the comprehensive construction works on Museum Island had to be interrupted that day, the scientist says happily. "Our system is mobile but during the measurements it reacts extremely sensitive to vibrations."

Let us finish for today. When bringing back the sitting goddess Ziemann points to the "statuette of a worshipper" made of limestone in the same glass case. This will be his next object. Enthusiastically, he points to the folded hands and the delicate fingers. Meanwhile, the mineralogist enjoys being in the museum. His admiration for the composition of the objects of his investigations has tremendously increased as a result of his dealing with these pieces of art and the detailed knowledge that he has acquired. "Also the students who help us are impressed by their beauty."

SABINE SÜTTERLIN

THE SCIENTIST

Dr. Martin Ziemann is senior scientist of the research group mineralogy at the Institute of Earth and Environmental Science. Mineralogists do not only deal with questions of geoscience and material science. Their research includes other fields like biology, medicine, astronomy – and also archaeology.

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Borders of the Unknown

Ludwig Leichhardt from Brandenburg on Expeditions through Australia

Friedrich Wilhelm Ludwig Leichhardt was born in 1813 in Trebatsch, Brandenburg. At the age of 35, he disappeared during an expedition through the hot Australian deserts under circumstances still unclear. His 200th birthday offers a new opportunity to commemorate him both in Germany and Australia and to review and reassess his work as well as the related stories from a postcolonial perspective. The research project "Leichhardt's Legacies: Locating the Disappeared" at the University of Potsdam funded by the DAAD takes up this challenge.

The sixth of nine children of a peat inspector in the water-abundant area of what is today the rural district Oder Spree, Ludwig Leichhardt studied practical philosophy, history of religion, linguistics, natural history, botany, metaphysics and physics in Berlin and Göttingen. He continued his studies in London and Paris and then traveled to Australia in 1842. From 1844 to 1845 he led his first expedition into Australia's unexplored heartland. After a journey of more than 4,800 km from Brisbane to Port Essington, he returned to Sydney a hero and discoverer of the northeast route through the continent. He was not only admired in Australia for his discoveries, among them the discovery of Australia's biggest coal deposit that would eventually contribute to the country's economic development, but also received prizes in Europe for his scientific achievements in geography and botany.

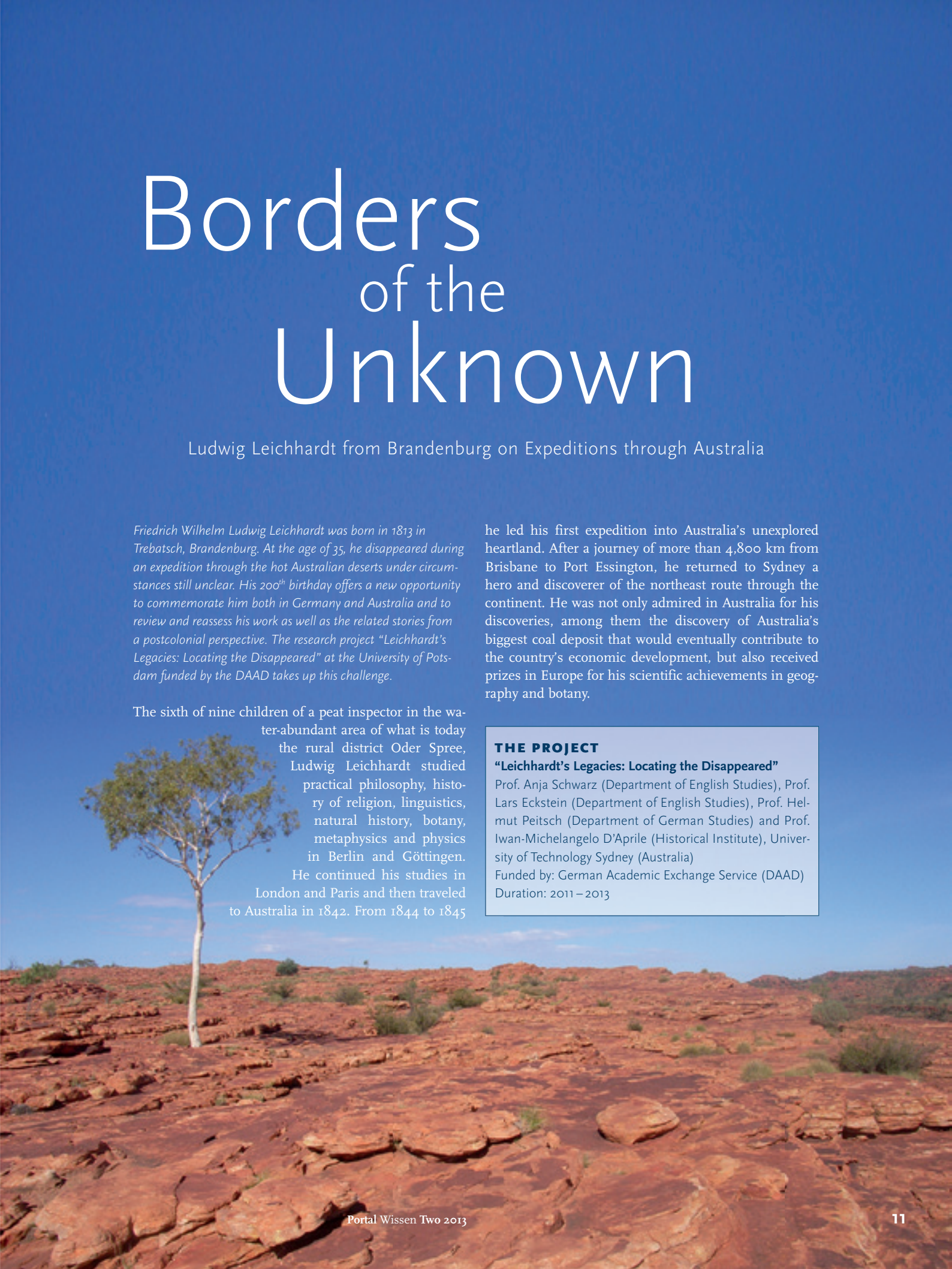
THE PROJECT

"Leichhardt's Legacies: Locating the Disappeared"

Prof. Anja Schwarz (Department of English Studies), Prof. Lars Eckstein (Department of English Studies), Prof. Helmut Peitsch (Department of German Studies) and Prof. Iwan-Michelangelo D'Aprile (Historical Institute), University of Technology Sydney (Australia)

Funded by: German Academic Exchange Service (DAAD)

Duration: 2011 – 2013



"In 1848 Ludwig Leichhardt and his whole team mysteriously disappeared."

The polymath and explorer embarked on a second expedition hoping to cross Australia from the east to the west. Although this attempt failed, Leichhardt did not give up. After almost two years of planning and organizing, he set out for his third and final expedition through the red continent in 1848. He was again unable to find a route from the northeast to the southwest. Worse yet: The explorer and his entire team disappeared mysteriously and without a trace. All search parties failed to explain the fate of Leichhardt and his team in the years after their disappearance.

In their project "Leichhardt's Legacies: Locating the Disappeared" Professor Anja Schwarz and Professor Lars Eckstein and their research partners focus on Leichhardt's flamboyant personality and significance beyond national contexts. The enthusiasm both in Germany and Australia sparked by his discoveries resulted in many landmarks, streets and municipalities to be named in honour of Leichhardt. The enthusiasm in Australia faded in the 1880s as Germany was becoming a direct imperial competitor in the Pacific. Leichhardt's detailed descriptions of the indigenous population in his travel journals may also have contradicted the white settlers' depiction of the Aborigines as a 'dying' race without justified claims to their land. Although the polymath of Humboldtian character himself was not free from the prevailing racist views of that time, he did, however, take the people seriously, in both his writing and deal-

THE SCIENTIST

Professor Anja Schwarz studied cultural studies and holds a PhD in postcolonial studies. Since 2010 she has been Junior Professor of British Cultural Studies at the University of Potsdam.

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Commemoration of the 'Prince of Explorers' Ludwig Leichhardt in the National Portrait Gallery of Australia, 2013.

Name plate of Leichhardt that was found in the Australian outback, about 1900.

ings with them. And because Australia fought alongside the British during the world wars, it became increasingly difficult to commemorate this German explorer as a significant actor in Australian history. His gradual rediscovery started in the 1980s and continues to today. How Germans have remembered Ludwig Leichhardt has also depended on the political context. He is the celebrated son in his birthplace Trebatsch – temporarily renamed "Leichhardt" under National Socialism – where there is still the Ludwig Leichhardt Museum. In Cottbus, the Ludwig Leichhardt Gymnasium and the Leichhardt House bear the name of the famous explorer. However, his significance goes far beyond these individual national or regional contexts and is now the subject of the German-Australian research project.

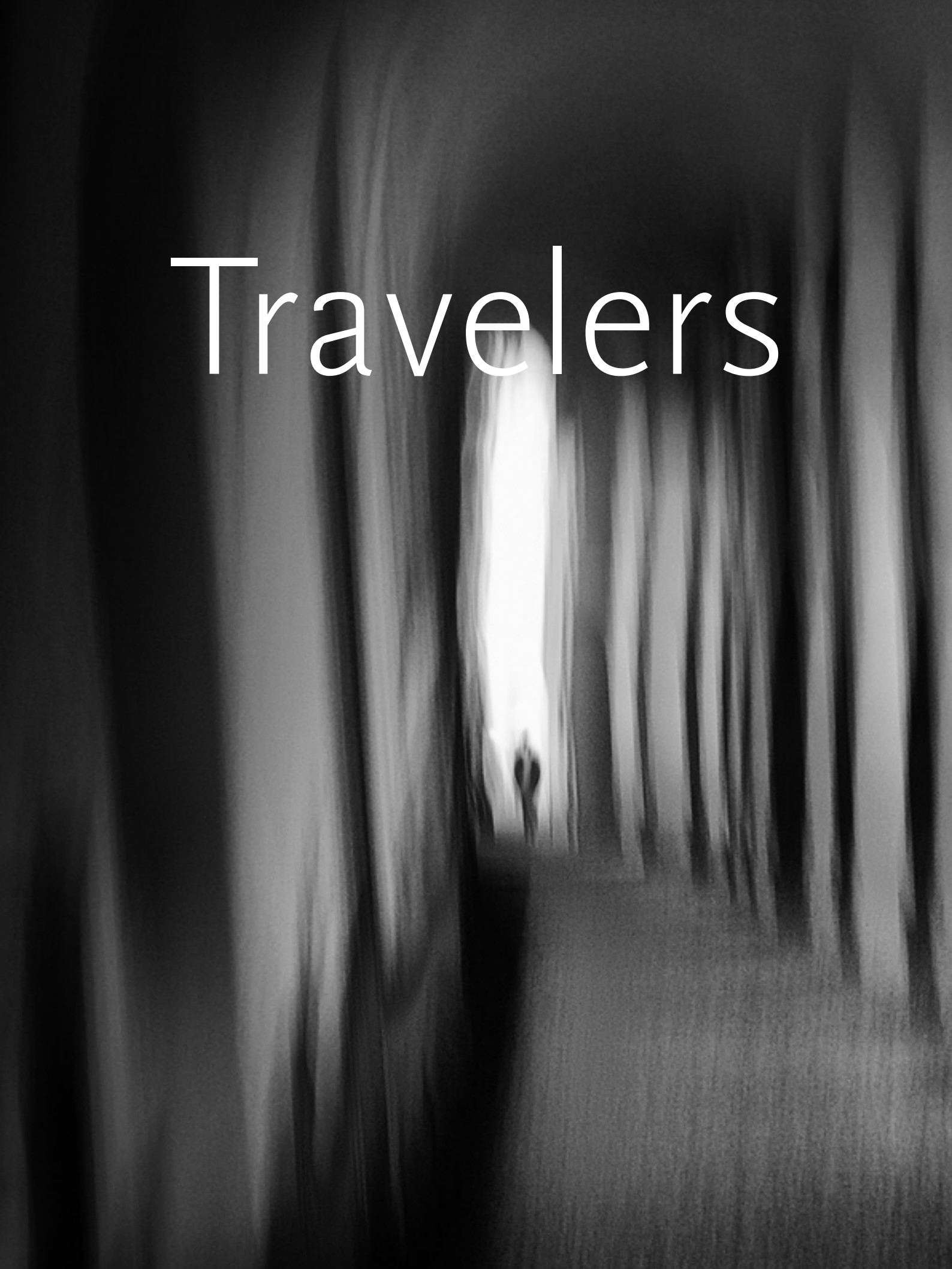
In collaboration with colleagues from the University of Technology in Sydney, academics from Potsdam are tracking the transnational and transcultural heritage of Leichhardt. By dealing with his writing and the numerous arguments and discussions about him in biographies, literature, tourism and popular culture, they want to reassess this heritage from the present point of view. Schwarz and her colleagues want to remind us that in wanting to push and to reduce the borders of the unknown onto the Australian continent, Leichhardt was also laying the groundwork for its colonization. In celebrating Leichhardt's achievements, it is easily forgotten, that the indigenous population has inhabited this country for more than 60,000 years: "They named their mountains and rivers long before. This country was not the blank, 'dark continent' that Leichhardt called it, and whose 'heart' he wanted to explore." Here the historical shift of borders meets a postcolonial perspective, indicating the geopolitical context of Leichhardt's travels and proclaims an intrinsic right to the land of the indigenous population. Leichhardt cannot, however, clearly be co-opted by one side or the other. Contrary to their historical intention, his travel reports have helped various Aboriginal groups support their legal claims for certain territories because their ancestors – as described by Leichhardt – were already living there. "Furthermore, I am particularly interested in the German reception of the Leichhardt narrative and the colonial imaginary it helped underpin. Traces of this colonial imaginary can still be found in the present," Schwarz says of her research approach.

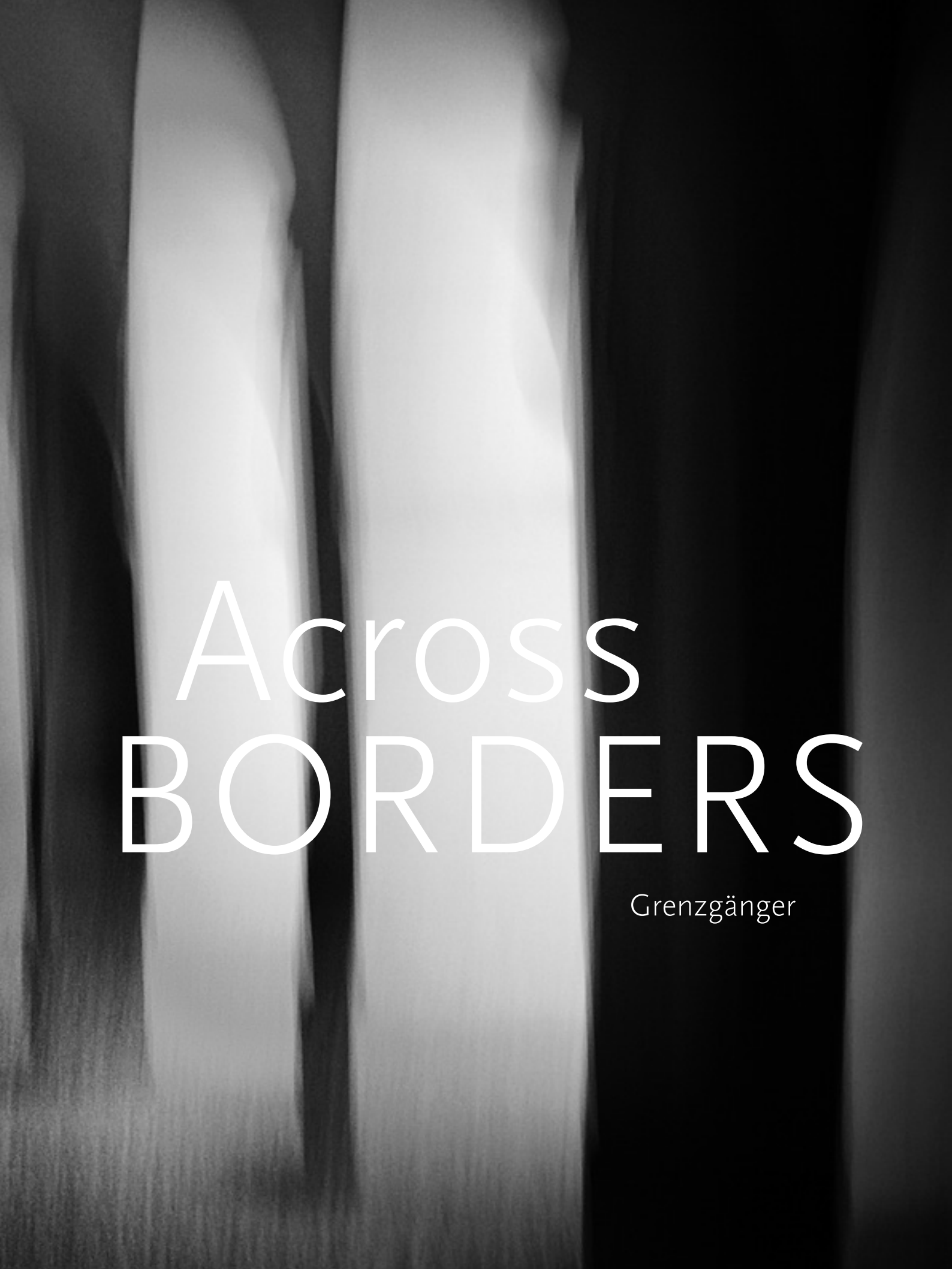
The DAAD-funded project provides the opportunity for an intensive exchange between two professors and three junior academics from Potsdam and Sydney respectively connected with several study visits. In addition, Leichhardt will be the topic of the international conference "1001 Leichhardts" at the Fürst Pückler Museum Park und Schloss Branitz near Cottbus. The exhibition "'Gut möglich, dass meine Knochen für immer auf den Ebenen dieser Kolonie bleichen werden': 200 years Ludwig Leichhardt" opened in the Fürst Pückler Museum on 4th May 2013 and the accompanying catalogue were curated and designed by members of the project team. The public got a first impression of Leichhardt's work and legacy at the Potsdam Science Day "Thousand Questions, One City" in June of this year.

"Leichhardt wanted to push and to reduce the borders of the unknown onto the Australian continent."

DR. SOPHIA ROST

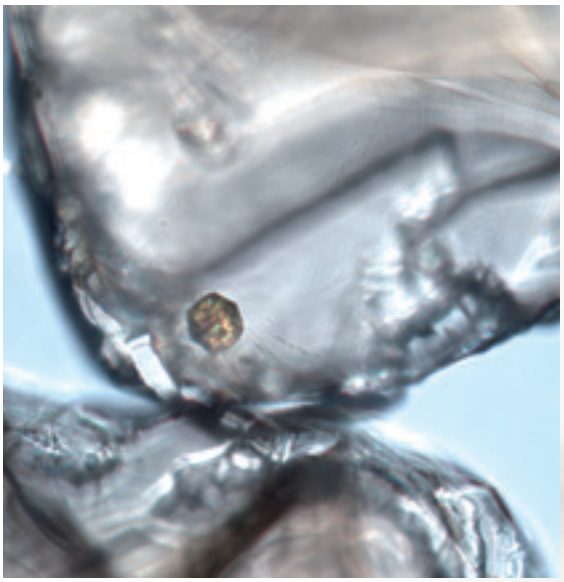
Ludwig Leichhardt. In the background: map with the route of Leichhardt's first expedition from 1844 – 1845.

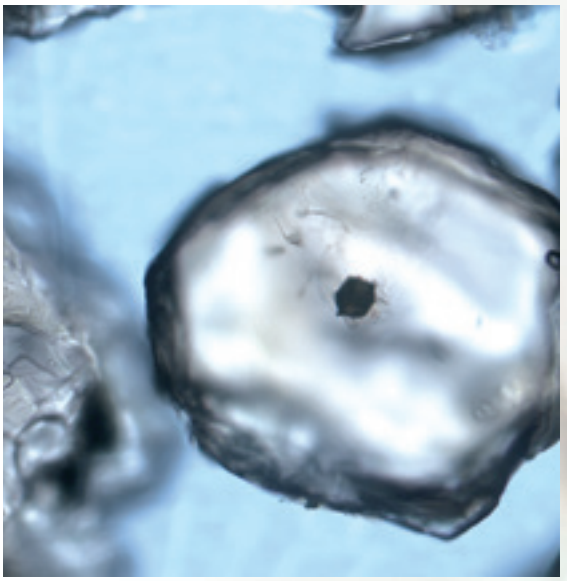

Travelers


Across
BORDERS
Grenzgänger

Set in Stone

What Geoscientist Silvio Ferrero Finds Inside Rocks is 500 Million Years Old

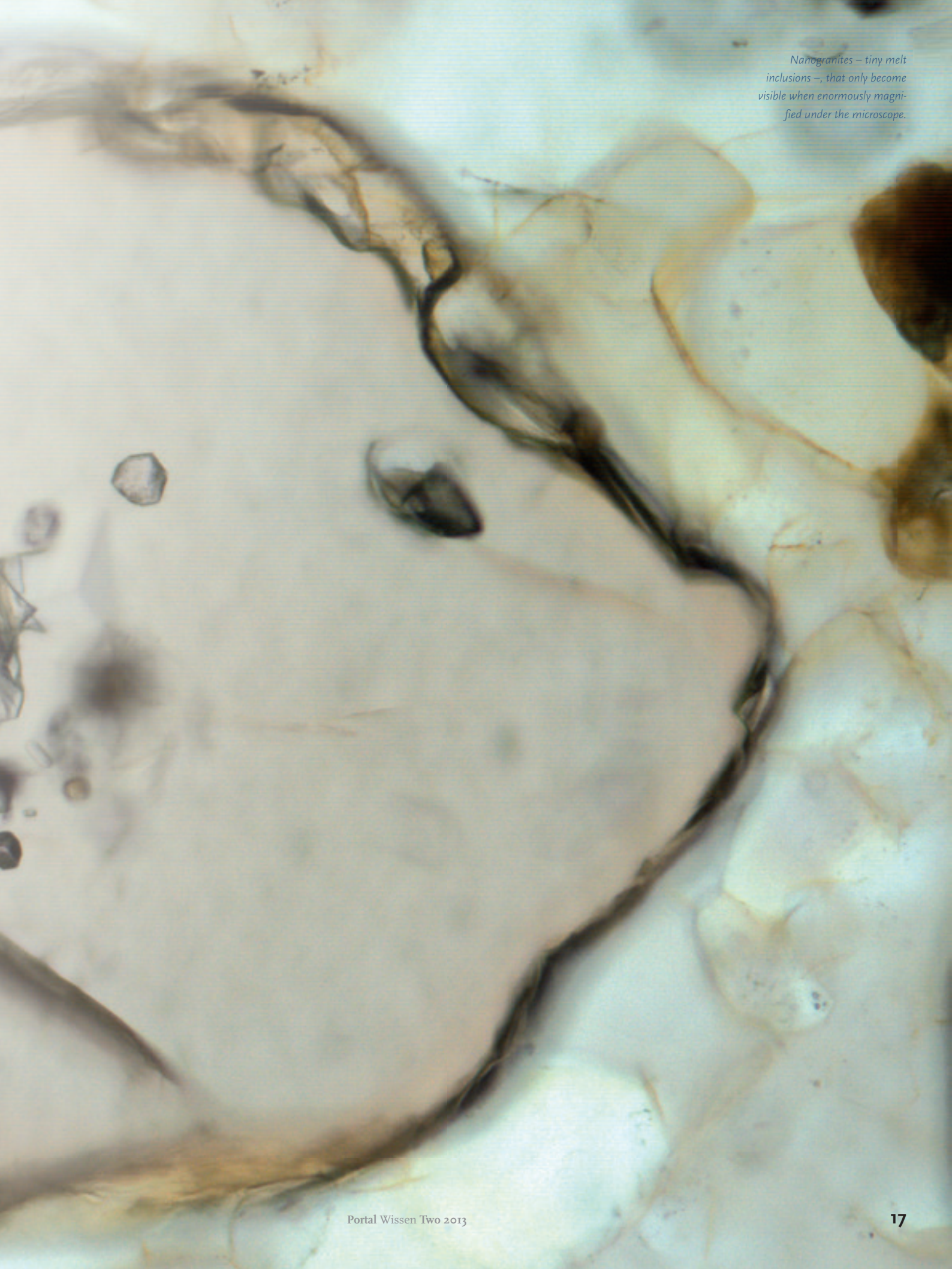




Stones move, not just in the pockets or backpacks of fascinated collectors around the world. Stones also move through rock: from the surface they get kilometers deep into the crust of the earth – and even back again. This takes millions of years, of course. But when you trace them and "listen" to them, they reveal astonishing details about the changes of the earth over millions of years. They also reveal the conditions in depths that no human being has been able to reach to date. Dr. Silvio Ferrero, Humboldt scholar at the Institute of Earth and Environmental Science, investigates these journeys.

Ferrero is a geoscientist, specialized in metamorphic rocks. Such rocks are the result of extremely high pressure and high temperature as they exist deep beneath the surface. When sediments that accumulate on the surface of the earth get into deeper layers of the earth's crust, they change their structure depending on the surrounding conditions. Ferrero is particularly passionate about the structures that you find inside rocks, the melt inclusions. Hidden in metamorphic rock that partially melted in the depth and hardened again on the way to the surface, these inclusions bring to light the secret of their genesis. While metamorphic rock is constantly changing during its journey through the earth's crust, the melt inclusions sometimes retain their formation conditions. This is exactly what makes them so interesting for geoscientists, as Ferrero explains. "In simple terms, they show – on a chemical level – what it looks like deep down there. Their composition and microstructural features enable us to draw conclusions on how deep the stone was at the time when it melted and trapped the inclusions."

Ferrero is a nanogranite "hunter". His tools are an electron microscope and microprobes. The inclusions that he examines are very tiny, just a few micrometers, i.e. a thousandth of a millimeter. This is just right for him. "I have always been more interested in the micro-level. I think that is where the secret of things lies. Of course, sometimes you have to step back a little and see the results



Nanogranites – tiny melt inclusions –, that only become visible when enormously magnified under the microscope.

THE SCIENTIST

Dr. Silvio Ferrero studied geology in Turin and then did his PhD in Padua. He has been at the Institute of Earth and Environmental Science of the University of Potsdam as a fellow of the Alexander von Humboldt Foundation since November 2012.

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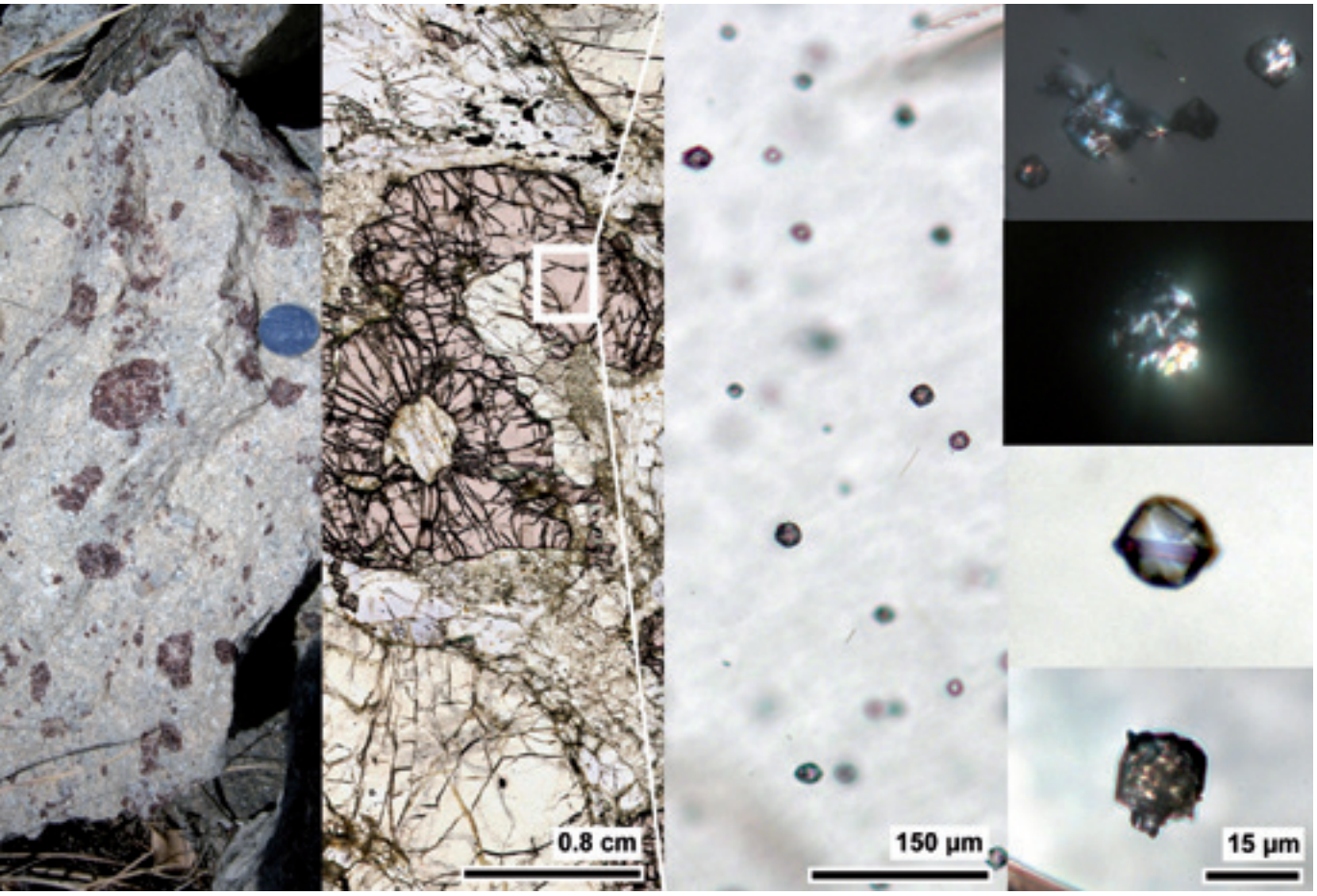
as a whole. To eventually understand the development of these stones means more: it is like a look into the geological history of the earth."

Silvio Ferrero comes from the Piedmont in the northwest of Italy. There the Alps are almost at your doorstep and you grow up with them. When he was a schoolboy, Ferrero worked as a stonemason during his holidays. This was the beginning of his passion that took him straight to university. During his geology studies in Turin, it became more refined: from the big to the small, from the field to laboratory. And he also developed his enthusiasm for research. After completing his master's degree, he had to ask himself the question: business or science? It did not take Ferrero very long to decide. "If I had gone into the world of business, I would have had the chance to travel the world, looking for petrol and other raw materials. But that would have meant saying goodbye to those things that I highly value: science, the exploration of the smallest details and putting them in a larger context. And I did not want that."

"It is not easy to find nanogranites; to 'read' them is even more difficult."

The opportunity to take up a career in research came in 2007 when he started work at the Geoscientific Department of the University of Padua. A research group was looking for tiny melt inclusions in metamorphic rock there. His experience in laboratory work opened the doors for Ferrero. "During my studies, all people literally pounced on fieldwork research while I felt much better in a laboratory for the most part. In Padua they were looking for someone who had experience with microscopes."



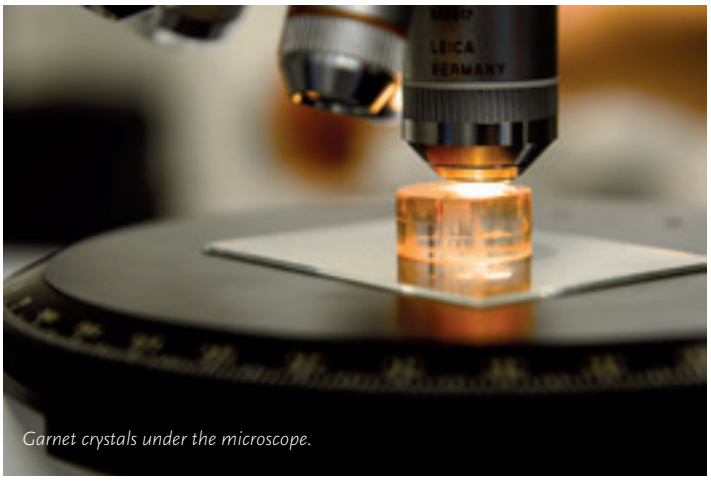
Collage of various magnifications of a sample from southern India (Kerala) analyzed under the microscope.

It is not easy to find nanogranites; to 'read' them is even more difficult. Until today, about ten verified occurrences are known from just as few sites. When Ferrero started his research in Padua, there had been just two. The team works with rock samples from a once active volcanic region in the south of Spain as well as with samples from the southern Indian province of Kerala. While the rock from Spain was taken to the surface by a volcanic eruption in a relatively short span of time, the samples found in Kerala came to light from a depth of about 25 kilometers over a period of many million years. What they had in common was their very special interior – both crystallized and glass inclusions that researchers were finally able to identify. The samples are cut into thin slices, between 100 and 250 micrometers thick. With such a thickness, the scientists were able to discover something. "We needed technologies with extremely high resolutions, both for the microscopes and the chemical analytical tools, to characterize the inclusions," Ferrero says. "Finally, we examined already known samples, 'old stones', with a much higher resolution than ever before – and were able to characterize the inclusions much more precisely." The special achievement: the scientists were able to describe products and processes – structurally and chemically – that take place in the inaccessible depth of the earth. Melting these inclusions again under laboratory conditions makes it possible to determine those conditions under which the nanogranites were originally formed – and which still determine the geological development of the earth. "You can say that we have found very old glass. Of course, it is much more than just glass. The inclusions tell us what is happening down there. And this, in turn, allows us to draw conclusions on how the earth's crust develops and how mountains are formed."

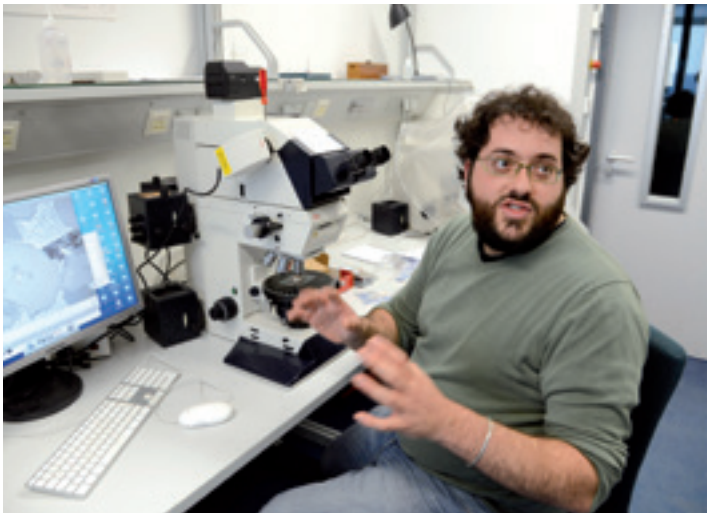
"The inclusions tell us what happens down there and allow us to draw conclusions about the development of the earth."

Meanwhile, the number of sites and samples of nanogranites is increasing. After he had finished his PhD in 2010, Ferrero worked on extending the database of known nanogranites. On a volcanic island off the coast of Tunisia, he gathered new samples. "At that time I was out in the field again," he says and laughs. "Although it is impossible to take all samples myself, it is important for me not just to work in the lab."

In Potsdam, where he has been a guest lecturer at the chair of petrology of Prof. Patrick O'Brien as a fellow of the Humboldt Foundation since November 2012, Ferrero looks even deeper into the earth: into the Bohemian Massif to be exact. "This is one of the most complicated regions in Europe," he says, "at least when it comes to my field of work." Just recently, some rocks with micro-diamonds were found in the Bohemian Massif. Their structure and chemical composition suggest that they got to the surface from a depth of about 120 kilometers. Ferrero hopes to find inclusions in them as well and to be able to examine and determine them more precisely. Thanks to this rock, which is millions of years old, new questions might arise for Ferrero's project during his stay in Potsdam, questions that he cannot predict today. "The entire field of research in which I am working is so new, so comprehensive that it has been developing at a tearing pace."



Garnet crystals under the microscope.


Dr. Silvio Ferrero examines rock samples for melt inclusions with a microscope.

Ferrero needs a certain freedom to be able to undertake this research. The scholarship of the Humboldt Foundation gives him such freedom. For him this is a lucky chance, as he emphasizes himself. The type of basic research that he pursues requires the courage to ask questions without already knowing the result. "The perfect situation for a geoscientist would be a talking stone," Ferrero says. "But such a thing does not exist. This is why we work a bit like detectives: we formulate a theory based on what we observe in nature, and then we work to find more data to prove – or disprove – our theory."

MATTHIAS ZIMMERMANN

Caribbean Kaleidoscope

The Fascination of Moving Non-Centers

The Caribbean? Gorgeous. Who has not envisioned himself/herself lying in a hammock under palm trees at the ocean watching the sunset? Who has not thought about indulging in the legendary Caribbean rhythms in sweltering nights? Legendary, exotic, almost mythical. These are long standing, continuously repeated clichés. Gesine Müller, Professor of Romance Languages, heads a research group that deals with literature from and about the Caribbean in the 19th century, a phase when most Caribbean countries underwent sweeping change. Almost all won their independence from their European colonial powers yet remained closely connected with them – especially culturally. The different relationship of the Spaniards and French to their Caribbean colonies, however, is reflected not least in the literature from there.

Gesine Müller's office is functionally furnished, almost spartan. The Caribbean happens here in the mind, as a journey – far away and into the depth of a long bygone era. However, it quickly becomes present. When Müller speaks about the "Kaleidoscope Caribbean", about the radiance of the events that stirred the Caribbean in the 19th century, you can suddenly imagine it, and it becomes more than just a dream destination for globetrotters. "The colonial Caribbean of the 19th century is an extremely interesting period, but has hardly been examined scholarly until now," she says. Several archipelagos and innumerable islands off the coast of the Americas make up the regions, where people of different cultural background have interacted for centuries. Unique to

The "exotic dream" – a Caribbean beach.

the Caribbean islands is their role as a former "melting pot", as a venue of "early processes of cultural globalization", according to Müller. A region where five European colonial powers operated, whose colonies gained independence at different points in time, where immigrants, slaves, expatriates and adventurers came together, "anticipated the phenomena and processes that we consciously perceive today."

Müller has been tracing the literature of the Caribbean for a number of years. Her current research project on the "Transcolonial Caribbean", an Emmy Noether Young Research Group, with the Chair Romance Literature of Professor Ottmar Ette at the University of Potsdam, began back in 2004. While working on her dissertation on Latin American contemporary literature, she came across traces of colonial literature of the Caribbean region again and again. "Then I decided to develop a project that comparatively analyzes the cultural detachment of various countries from their European colonial powers." When there was the opportunity to apply for a research group within the scope of the Emmy Noether Programme for her project, she did not hesitate. In 2008 her application was approved as the first young research group in Romance literary studies. The heads of newly founded Emmy Noether young research groups can establish their projects at a chair of their choice. Müller decided in favor of Potsdam, where the expert in Romance literature, Ottmar Ette, has been working on the Caribbean and transfer research for quite some time.
It not only took a while to form the group but rounding up the object of their investigation – Caribbean literature of the 19th century – was also quite an adventure. Müller visited archives and libraries across the archipelagos to compile a corpus of the most important Caribbean texts that would later form a central reference point for all partial projects. It was worth it though because these texts offer insight into the exceptionally versatile cultural history of the region.

An expert in Romance languages and literature, Müller is very interested in the comparison between the former Spanish and French colonies in the Caribbean. A mere look into the historical development already suggests differences. While all Spanish colonies gained independence in the 19th century, all the French – with the exception of Haiti, independent since its early revolution in 1804 – remained under the influence of the colonial power, which remains essentially true today. The reason for this, Müller says, is the strategy of France in dealing with the unique characteristics of the indigenous peoples. "The pronounced radiance and cohesive power of France speaks to its capacity to integrate the colonial Other and to undergo transformations itself as it is faced with that Other."

"The colonial Caribbean anticipated phenomena and processes that we have been realizing today."

THE SCIENTISTS

PD Dr. Gesine Müller, studied Romance philology, theology and German language and literature in Freiburg, Bogotá, and Münster. Since 2008 she has been head of the DFG Emmy Noether Junior Research Group at the Department of Roman Studies at the University of Potsdam.

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Johanna Abel studied Spanish philology and religious studies in Berlin. Since 2008 she has been a research associate of the Emmy Noether Junior Research Group "Transcolonial Caribbean".

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This meant that the francophone Caribbean literature was always oriented towards Paris. Its authors imitated the writing of French classical authors without being a real copy. Müller calls this a "literary staging of the binary opposition between metropolis and colony". The Caribbean intellectuals not only closely bound their homeland to the remote colonial power, but also even sometimes advocated for the preservation of slavery, apparently in good faith that this would be to the advantage of the slaves. The orientation of the Caribbean writers on the remote center of the francophone realm was also promoted by the French publishing industry that was completely dominated by Paris. If an author wanted to be read, he or she had to find a publisher in the capital. This was an economically motivated dependence that has partially continued until today.

"Spain was not able to offer its colonies such a 'culturally integrating center' like France."

Spain, unlike France, was not able to offer its colonies such a "culturally integrating center," Müller says. In addition to the earlier and more vehement independence efforts, it also liberated literature in some way. As a consequence, writers were looking elsewhere for new points of reference and new networks. They often found them on the American mainland but also identified shared history as a connecting element within the Caribbean and with Europe.

Many Spanish-speaking authors were therefore committed to a principle of "multirelationality", Müller explains. Already in 1870, Puerto Rican Eugenio María de Hostos considered the Antilles "the connection, the fusion of various ideas from Europe and the Americas".

The Spanish-speaking Caribbean is also the subject of the work of Johanna Abel, one of the three young academics writing her PhD thesis in the Emmy Noether Young Research Group. In fact, she has analyzed the texts of 25 western women who wrote about their travels to the Caribbean to explain which literary expression they found for their intensely physical impression of this world somehow completely new to them. "The Caribbean was an intersection of movements of all kinds, of the military, slave trade and migration. Many cultures came together here which learnt to live together. This made it a unique 'rhythmic space," Abel says, "that had an irritating, overwhelming effect due to the contemporaneousness of the uncontemporary, i.e. things that actually exclude each other. Newcomers had problems dealing with this abundance of sounds, presence and contact. This was also expressed in many texts of travellers."

Due to better transportation, more and more women came to the Caribbean in the 19th century. They often traveled in the company of men but occasionally did so alone, like Mathilde Houston, a former court lady of the English Queen. Her letters to friends living in the British homeland were published later. Abel's analysis shows that

Caribbean reality on Cuba.

these writing women did not only travel on the tracks of men. "They were colonial agents like the men and oriented themselves by the male canon of writing about the Caribbean, a romanticized and exoticized style. At the same time it became clear that they often developed their own views that mainly expanded into their writing through "body knowledge". They reflected how they perceived fashion, nakedness and masking but also how they as women and foreigners were themselves perceived. They were quite versatile in writing about their experiences: sometimes utopian and idolizing, sometimes defensive and other times culturally critical, even of European culture."

Towards the end of the 19th century the first precursors of tourism were developing, mainly from the USA. Group tours by train were "in", as well as island hopping. Writing became more factual, often more journalistic. Some texts even took on the role of early travel guides. "This has shown me how up-to-date the colonial Caribbean is," Abel says. "On the other hand, the exotic colonial image of the Caribbean has been kept alive there and has repercussions on the western world."

The relation between colony and colonial power was not a one-way street in the French-speaking Caribbean of the 19th century either. France used information gathered in the colonies about foreign lands to expand its own knowledge. The ethnology that emerged in France at the turn of the 19th century had been considerably developed by findings gathered in the French colonies. Something else found its way from the margins of the world to Europe: the transfigured picture of the exotic Caribbean. Many 19th-century authors made the colonies vanishing points of their writing, creating a vision of an ideal, utopian Caribbean in their texts. Many years would pass before there was a debate about the reality in the French colonial empire, Müller explains. "Only in the last 20 years has its own colonial history become an important issue. Meanwhile, the 10th May is the commemoration day of slavery and colonialism, although neither topic has been in the public discussion for long."

Regarding colonial literature of the Caribbean as a whole, Gesine Müller says that its close connection to "the discourses about the colonial Other" make it particularly interesting in the period of current globalisation. While confronted with the phenomena of mass migration, circulation and networking, it can "sensitize as an early messenger for the category of the in-between, communicable only through the potential of literature". This is why Müller and the young researchers in her group have looked for links to current discourses and questions. Over the past years, two large conferences – on the "Kaleidoscope Caribbean" and the important cultural, literary phenomenon of the island "worldwide" – and many collaborative activities have been good opportunities to integrate the work on the literary colonial Caribbean with research on contemporary Caribbean literature. These connections go in both directions, Müller underlines, because she sees the Caribbean of the 19th century as a collection of hubs that were much more productive than we are ready to believe today. "In a global context, a lot more happened in these non-centers than previously thought," she says. "Cultural exchange processes were more important than we have expected so far – also for Europe."

"Its own colonial history has become an important issue in France only in the last 20 years."

MATTHIAS ZIMMERMANN

THE PROJECT

Emmy Noether Junior Research Group "Processes of Cultural Transfer in 19th-Century Literature: The Caribbean within the Context of the Cultural Radiance of Europe, Exemplified by France and Spain (1789–1886)"

PD Dr. Gesine Müller (Head), Johanna Abel, Leonie Meyer-Krentler, Marion Schotsch

Funded by: German Research Foundation (DFG)

Duration: 2008 – 2014

www.uni-potsdam.de/romanistik/ette/projekte/transkaribik/index.html

Politics Upclose

The Institute of Local Government Studies

They decide where to build new bike paths and how many places to create in day-care centers for children. They also decide about the opening hours of the public swimming pool or the design of public green spaces. Local politicians in the 13,000 municipalities of Germany are responsible for a safe transport network in towns, communities and villages, for waste management and new residential buildings. Where and how to spend the scarce financial resources – for a new youth club or for a theater? These are also decisions taken by local, county, town, and local advisory councils. What are the structures of local policies and what is necessary to meet municipal responsibilities? How to set the course to meet future challenges? These are some of the questions analyzed by the Institute of Local Government Studies (Kommunalwissenschaftliches Institut – KWI) of the University of Potsdam.

For more than 20 years academics of law, political, social and administrational sciences at the KWI have been analyzing theoretical concepts and problems of local policies using an interdisciplinary approach. The political upheaval after the end of the Cold War also changed municipal political work fundamentally on the territory of the former GDR. Democracy found its way, existing structures and institutions of the new

INSTITUTE OF LOCAL GOVERNMENT STUDIES

The Institute of Local Government Studies of the University of Potsdam has been focussing on the consultancy of local governments since 1993. Scientists of the Faculty of Law and the Department of Economic and Social Sciences do interdisciplinary research on aspects of local policies. The institute regularly holds conferences and seminars and publishes series on current local government affairs.

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Scholars and local politicians at a conference of the KWI in May 2013.

German Laender had to be rearranged and adjusted to democratic principles. "There was the wish to have an institution that would observe, evaluate and document this process scientifically," Dr. Christiane Büchner, Managing Director, describes the founding history of the institute. "And this is where we needed academic expertise." It was necessary to establish local self-government almost overnight based on the models of the old German Laender.

The KWI has retained this practical orientation until today. In addition to scientific research, for example on municipal cooperation, finances, local government reorganization or task sharing of communities and the private sector, the important pillars of the institute are further training and consultations. The KWI understands itself not exclusively as an institution of municipal law but of municipal research where legal, economic and administrational specialists do research and teach together, focussing their work on the new German Laender. "This makes us unique throughout Germany," Hartmut Bauer emphasizes, who is the Managing Director of the Institute and Professor of European and German Constitutional Law, Social Law and Public Business Law. Students learn the basics of local administration and politics during their seminars at the KWI. They discuss causes and results of political reforms on the local level. They also evaluate experiences and concepts of individual federal states. The institute offers further training for practitioners in local politics – civil servants, district administrators, mayors as well as lawyers of public law. There are expert conferences twice a year. Scientists and politicians come together to exchange experience and the latest results of their research, and they also speak about strategies to resolve current problems.

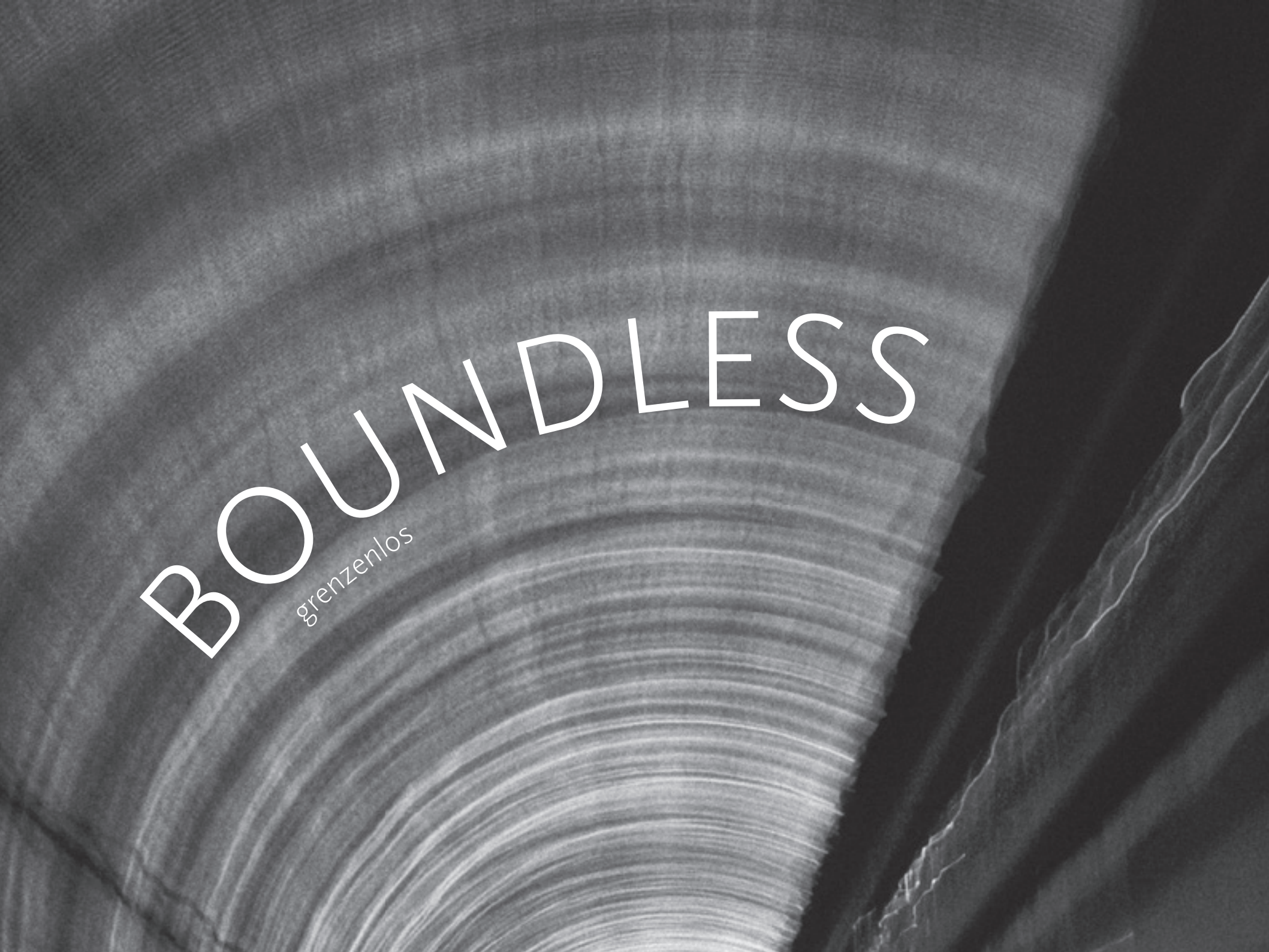
But first and foremost, they provide advice for those who actively shape local politics. "There is such a high need for consultations and advice because local work in practice is highly marked by voluntary engagement," Thorsten Ingo Schmidt explains, who is board member of the KWI and Professor of Public Law, in particular Constitutional, Administrative and Municipal Law. Community representatives, members of county councils, mayors of small communities – they all work on a voluntary basis, in many cases having a work life as well. "They all have to cope with requirements similar to those of executive managers in private enterprises," Schmidt points out. Like an enterprise, communities have governance structures and have to deal with human resources, finances and organization. The demand for consultation services is correspondingly high.

Much-needed administrational reforms, demographic change or privatisation and remunicipalisation of public services are specific challenges for local governments, Bauer explains. A shrinking population leads to a decrease in municipal income. However, the responsibilities that the communities have to master remain the same. In these problem areas, communities, governmental departments and parliaments of the federal states draw on the expertise of the KWI. Being authorities on these subjects, the experts of KWI frequently give their opinions and write reports for the parliaments of Brandenburg and other federal states. Members of the KWI are also present in two enquete commissions of the Brandenburg parliament. They support members of parliament in reviewing complex issues.

"There is a strong need for consultations and advice because local practical work is highly marked by voluntary engagement."

Reports and opinions of the KWI are much appreciated at the political level – expert knowledge but also neutrality of the institute speak for themselves. "The opinions and statements of the KWI are not governed by certain interests or by a lobby as it may sometimes happen with other experts," Thorsten Ingo Schmidt points out. Members of the KWI present their concepts as scientists and not as representatives of specific groups. They assess drafts of a law, analyze the impacts of political actions and do not work towards a certain result. "We do not express any political but academic points of view," Büchner underlines. Nevertheless, the scientists have to stand their ground in the political debate. "You have to face up to the questions and answers of the committee members," Büchner says. "This is similar to the situation of an examination," Schmidt compares with a smile. They pass such exams with great success in most cases. The extremely positive feedback shows this very clearly. "You have given us the crucial impulse" – this is what committee members across parties repeatedly expressed to the scientists, Bauer says.

HEIKE KAMPE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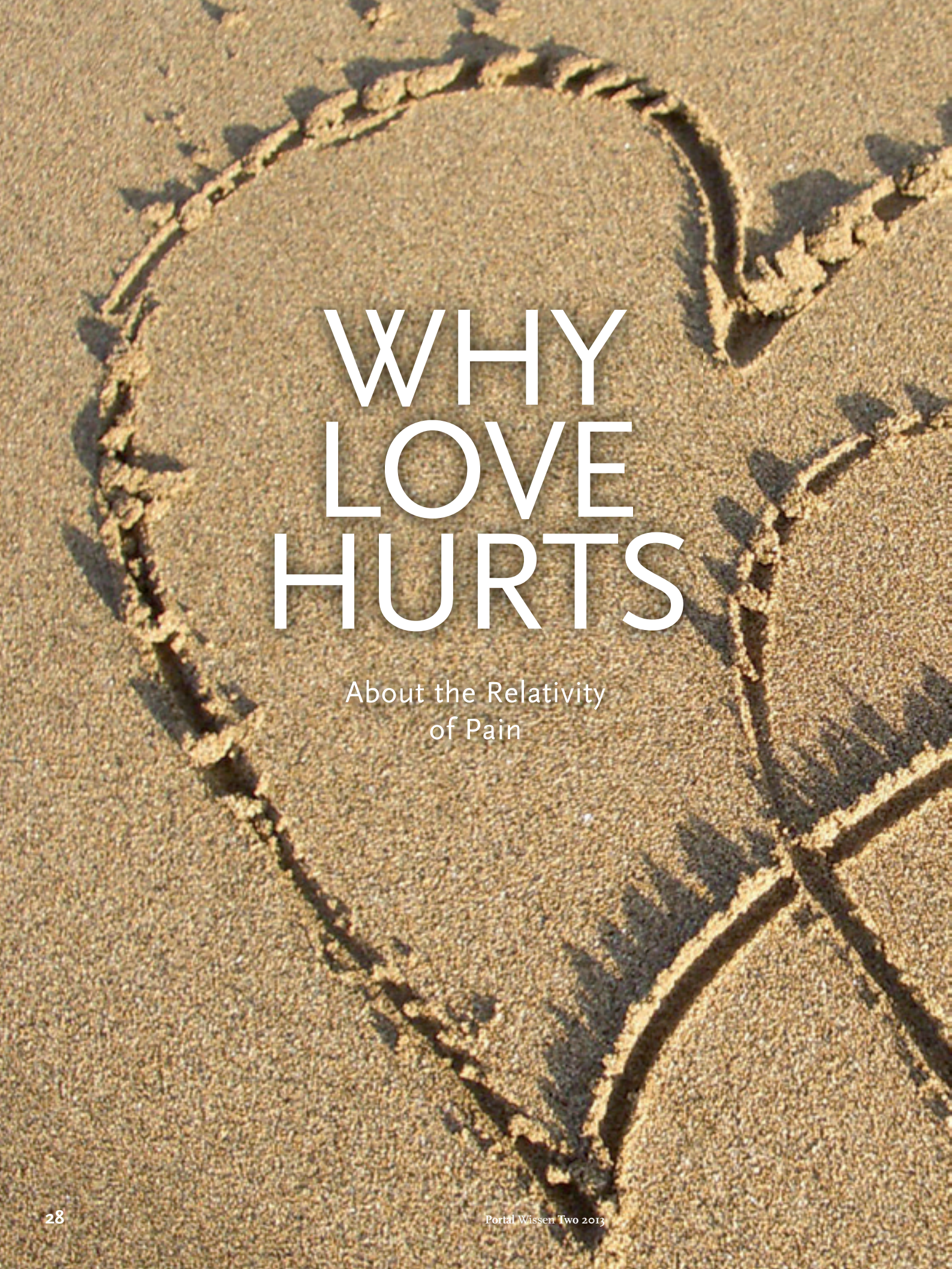

WHY LOVE HURTS

About the Relativity of Pain

Pain is a reaction of the body to an objectively measurable stimulus. How we sense pain subjectively, whether we rate it as merely unpleasant or as unbearable depends on more factors than just physical reactions. Apart from individual characteristics, environment also plays a considerable role. How social support, relationships and empathy influence pain and which psychological mechanisms can explain such effects is being examined by an international and interdisciplinary research team. Potsdam-based social-cognitive psychologist Anne Springer is a member of this team. Sabine Sütterlin spoke with her.

"Why Love Hurts: The Social Modulation of Pain": The unusual title of your research project immediately arouses curiosity. What is this project about?
We proceeded from the repeatedly reported connection between pain and social factors. Since the 1970s, it has been known that patients ask for fewer painkillers after an operation if they have been mentally prepared for and informed about the potential pain. Labor pain is another example. Studies in the 1980s showed that it also depends on the empathy of the partner and midwife during childbirth. In an earlier project, we basically looked at social influences on experiencing pain. We were interested in the underlying mechanisms of this effect, which is still fairly open from a psychological and neuroscientific point of view. In contrast to many previous studies, we have not only explored mere correlations but have also pursued an experimental approach. The current project "Why Love Hurts" was established on the basis of the older project. It focuses on the influence of humans or animals to whom we have a close emotional relationship. Our project title addresses this point. A lot of loving kindness and attention can even intensify pain.

The international project team includes researchers from various disciplines: neuroscientist Aikaterini Fotopoulou from University College London and philosopher Verena Gottschling from York University in Toronto, Canada. You are a social-cognitive psychologist who researches at the Department of Sport and Health Sciences of the University of Potsdam. How does such cross-border collaboration come about, and how does it work?
We met at a workshop in Döllnsee near Berlin in 2006 that had been kick-started by the Volkswagen Foundation as part of their initiative "European Platform for Life Sciences, Mind Sciences and the Humanities". The aim of the program is a more intensive exchange among young researchers who work at the intersections of cognitive neurosciences and the humanities and social sciences. Over the course of cluster projects, the hope is that participants develop new interdisciplinary questions for joint research and overcome the interdisciplinary borders. Each of us applied with her own project proposal. During a workshop, we discussed the imagined topics from the perspectives of various disciplines. After two days in Döllnsee, the original constellations had become quite mixed up. New teams had formed, including ours. After that, the groups elaborated proposals for new research projects. These were evaluated by an international academic committee and were, in the best case, approved.

Why are you interested in pain at all?
Pain is a central issue in medicine. Chronic backache is obviously the second-most common reason why people see a doctor. The general German health insurance provider AOK names it as the most common reason for inability to work. In Germany, chronic backache is estimated to cost the state up to 22 billion Euros annually, an enormous sum. In other European countries, the situation is similar.
The more precisely we understand pain and the involved mechanisms, the better we can treat it. The puzzling aspect of pain is the specific combination of physical sensation of an objectively measurable stimulus with the subjective emotional component. In other words, pain is much more than just a mere physical signal. We therefore cannot understand it solely from a medical perspective. Individual and interpersonal factors also play a considerable role. Exactly these factors are increasingly coming into the focus of neuroscientific and psychological pain research.
Our studies should help to better understand how relationships between individuals can influence pain, i.e. what the role of interpersonal relations is. It is also important to better understand the decisive individual characteristics. Our results are therefore important for those with chronic pain and their relatives, for medical as well as other fields like pain management, physiotherapy, psychotherapy or care. Even children can suffer from chronic pain like backache.

At the beginning of the current project, which ends in 2014, you first recorded the state of knowledge.
In a recently published overview article we have described all available experimental studies that had analyzed, for example, how the presence of others, their behaviour, empathy or even their physical proximity to the sufferer can influence pain perception. We found 26 articles altogether, comprising a wide range of different social factors and collected pain reactions. As a result, we were able to ascertain that the modulation of pain seems to depend on the extent to which present social partners can actively support the sufferer or at least have the opportunity to give active support by getting help. It is also important if and to what extent the sufferer is aware of the intended actions of

others. The relationship between the test person and observer was significant – unknown, related or one's own partner. Based on our findings, we assume that social interactions in situations of pain are seen as cue stimuli signalling "safety" or rather "danger". As a consequence, others can increase or reduce the intensity of painful stimuli.

And how do you experimentally investigate this?
We exposed our test subjects to a quite artificial kind of pain. We ask them to put their hands into a bucket of cold water (3°C). The advantage of this is that we can systematically manipulate and control in the laboratory the external factors that interest us. From the measured effects of pain perception, we can draw specific conclusions about the factors that substantially influenced the pain.
A good example is an experiment that we have recently submitted for publication. For this, the participants were asked to bring along either their dog or a good friend. A third group was alone in the lab during the cold-water task. Apart from that, the test conditions were identical, and the systematic differences in assessing the pain should reflect only the presence or absence of the dog or friend. The next exciting question was which direction the effect would go and whether the pain would be stronger or alleviated.

Dog or friend – who did better?
In fact, dogs seem to help more than good friends do. Our test subjects rated the stimulus, i.e. the contact with the icy cold water, as less painful if they had their dog with them compared to being alone or with a good friend. They also stated that they felt less helpless and could hold their hands in the cold water for longer than other participants. Interestingly, their unconscious, that is, genuine physical reactions, like skin conductance or tension of the masticatory muscle, were reduced. Our results suggest that one's own dog can have especially positive effects on handling acute pain and can support the person suffering from pain even more than a human friend could.
Our three test groups were as comparable as possible. All test subjects had a pet with a similarly close relationship to him or her. They were also similar in terms of their experience with painful situations and handling of the cold-water task. Thus, all these factors cannot explain the observed "dog effect". We assume that the unconditional and completely value-free love of a pet toward his or her caretaker positively influences the human's emotional state in painful situations.

So, more pets in hospitals?
Since we have examined only healthy test subjects so far, we cannot generalize these findings for pain patients. We can nevertheless assume that pets can contribute to the treatment of pain. It may be possible that contact to a pet can be therapeutically reasonable if medical or other traditional forms of treatment are not or only limitedly applicable for pain. There have been many successful examples with children in cases of ADHD or anxieties, among others. We have already planned a study with test subjects suffering from chronic backache to test the influence of pets on them as well.

Can human consolation also have an effect?
Yes, of course! Our experiments so far suggest, though, that the presence of others does not necessarily have positive effects on the experience of pain in all cases. The effect others have on pain obviously depends on their empathy and the kind of social relationship they have with the sufferer as well as on the individual style of bonding and the strategies the sufferer uses to handle pain. An example: People who tend to avoid social relationships show less pain when exposed to unpleasant stimuli alone rather than in the presence of others. People who have a greater need for bonding endure pain better if there is an empathic observer in the room compared to a less empathic one. This was proven by a study of our project published in 2010.

Regarding the neuroscientific side: How does the brain ensure that love hurts or helps?
In a series of studies conducted in London, we also

A test subject with her dog during the pain experiment.

looked at how such social influences are processed in the human brain and in turn how such processing affects the subjective experience of pain. We used neuroimaging and electrophysiological methods to study how the presence and empathy of our own partner may affect our pain and we found that the brain achieves this by increasing processing in areas that are known to map the salience or importance of events for the organism. For example, when our partners seem emotionally concerned about our pain, the brain decides that the organism needs to attribute self-attention and care to that body part. Finally, we have also investigated the neurobiology of the social context of pain, by studying how pain is affected when healthy individuals are given a safe quantity of a neuropeptide called oxytocin which is known to increase affiliative feelings and social trust, and is linked to physiological processes involved in many social activities such as birth, lactation and sex. We found that intranasal oxytocin administration decreased both the subjective experience of pain and the corresponding electrical activity in the brain. These studies suggest that pain is subject to social influences and not a mere, direct outcome of damage to the body and importantly provide the first key steps in understanding the neurobiological mechanisms by which social factors influence subjective pain.

THE PROJECT | THE SCIENTIST

"Why Love Hurts: The Social Modulation of Pain"

The social-cognitive psychologist **Dr. Anne Springer** has been at the University of Potsdam since 2010. She has worked on the interdisciplinary project "Why Love Hurts: The Social Modulation of Pain" that she founded in cooperation with neuroscientist Dr. Aikaterini Fotopoulou of University College London, the principal investigator of the team, and philosopher Dr. Verena Gottschling of York University in Toronto. In the meantime, some external partners have joined the project, including psychologist Professor Ursula Hess of Humboldt Universität, Berlin, and Yannis Paloyelis, Charlotte Krahe, Matt Howard and Steve Williams from King's College London. The VW Foundation funds the project that started in 2011 and is planned for a four-year period.

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A true friend – an animal in particular – can help to ameliorate the pain.

Bit by Bit

Gilles Blanchard Uses Statistics for Machine Learning

Not only people but also computers learn. Character and spam recognition are examples of how computer programs automatically learn to make predictions. Learning theory deals with the mathematical analysis of properties of such methods and is closely linked to statistics. Gilles Blanchard, Professor of Mathematical Statistics, researches in this field.

A machine, an artificial system, learns from examples and then generalizes with the help of mathematical models. By analyzing individual examples, the system "recognizes" regularities to evaluate unknown data. This is used for automated diagnostic methods, detecting credit card fraud, stock market analyses, classifying DNA sequences, speech and handwriting recognition.

Large quantities of data, pictures or texts are processed in machine learning. When different people write the digit 2, they produce a corresponding number of "individual twos". The databases that have been generated in this way provide the foundation for learning and prediction programs. For example, the machine learns to recognize automatically which digits have been written in letters. "The program is fed with examples, compares pictures and recognizes similarities. These examples are used to create a classification," Blanchard describes the procedure. It helps to identify addresses on postal items during automatic sorting as well as licence plates. It is not surprising that the machine can learn to recognize printed text much more easily than handwritten. Speech recognition is extremely useful, as with automatic translations, a classical example of machine learning. They are not perfect but do provide a basic structure. You can even recognize faces in this way.

Methods of machine learning are being used for many applications in bioinformatics: physicians use a lot of data, like information from magnet resonance tomography, computer tomography and genetic data. Machines are helpful assistants in these fields, for example, in detecting diseases like breast cancer.

As with human beings, the learning process for machines is complicated and strenuous because it always has to capture many variations. In order to invent new architectures and methods, analogies are often drawn to the human brain during programming. "It is extremely difficult to establish logical rules because you cannot always identify the logic of nature," Blanchard says. The many random variations and errors make mathematical tools of probability theory suitable for analysis.

Informatics, probability theory and statistics are inextricably linked in machine learning. Gilles Blanchard's scientific career illustrates the connections and development of these fields. He studied mathematics in Paris and completed his PhD there. In 2002, the scientist started working at the Fraunhofer Institute for Computer Architecture and Software Technology in Berlin, where he was mainly engaged in machine learning. Since 2009 Blanchard has been working in the statistics group at the Weierstrass Institute for Applied Analysis and Stochastics in Berlin. He became Professor of Mathematical Statistics at the Institute of Mathematics of the University of Potsdam in 2010. For him, the appeal lies in working at the intersection of these interacting scientific fields. This is why the mathematician closely collaborates with the computer scientist Tobias Scheffer, Professor of Machine Learning at the Department of Computer Science.

"It is extremely difficult to establish logical rules because you cannot always identify the logic of nature."

THE PROJECT

Massive Sets of Heuristics (MASH)

Funded by: European Union

Duration: 2011 – 2013

www.mash-project.eu

Blanchard and his colleagues have been working on the project MASH (Massive Sets of Heuristics) for three years. This is an EU-funded project to develop a common platform for collaborative machine learning. In addition to the University of Potsdam, four partner institutions from Switzerland, France, and the Czech Republic are taking part. They want to establish a learning system in collaboration with big groups of contributors from various branches and with different backgrounds. "The basic idea of the project is to use the expertise of many individuals and to combine the programs they developed to extract features," says PhD student Andre Beinrucker. Different handwritings and perspectives create many parts of programs to ultimately form one large system.

Applying learning methods that have been developed in the project, a robot arm is learning "of its own accord", first by trial and error, to accomplish simple tasks, like separating a red cube from other shapes. All parties involved in the project deliver "small" pieces of information and programs. "The point is not to write a complete program that solves everything. Each piece of information is important, and this is why we work collaboratively," Beinrucker says.

DR. BARBARA ECKARDT

THE SCIENTIST

Professor Gilles Blanchard studied mathematics in Paris. Since 2010 he has been Professor of Mathematical Statistics at the University of Potsdam.

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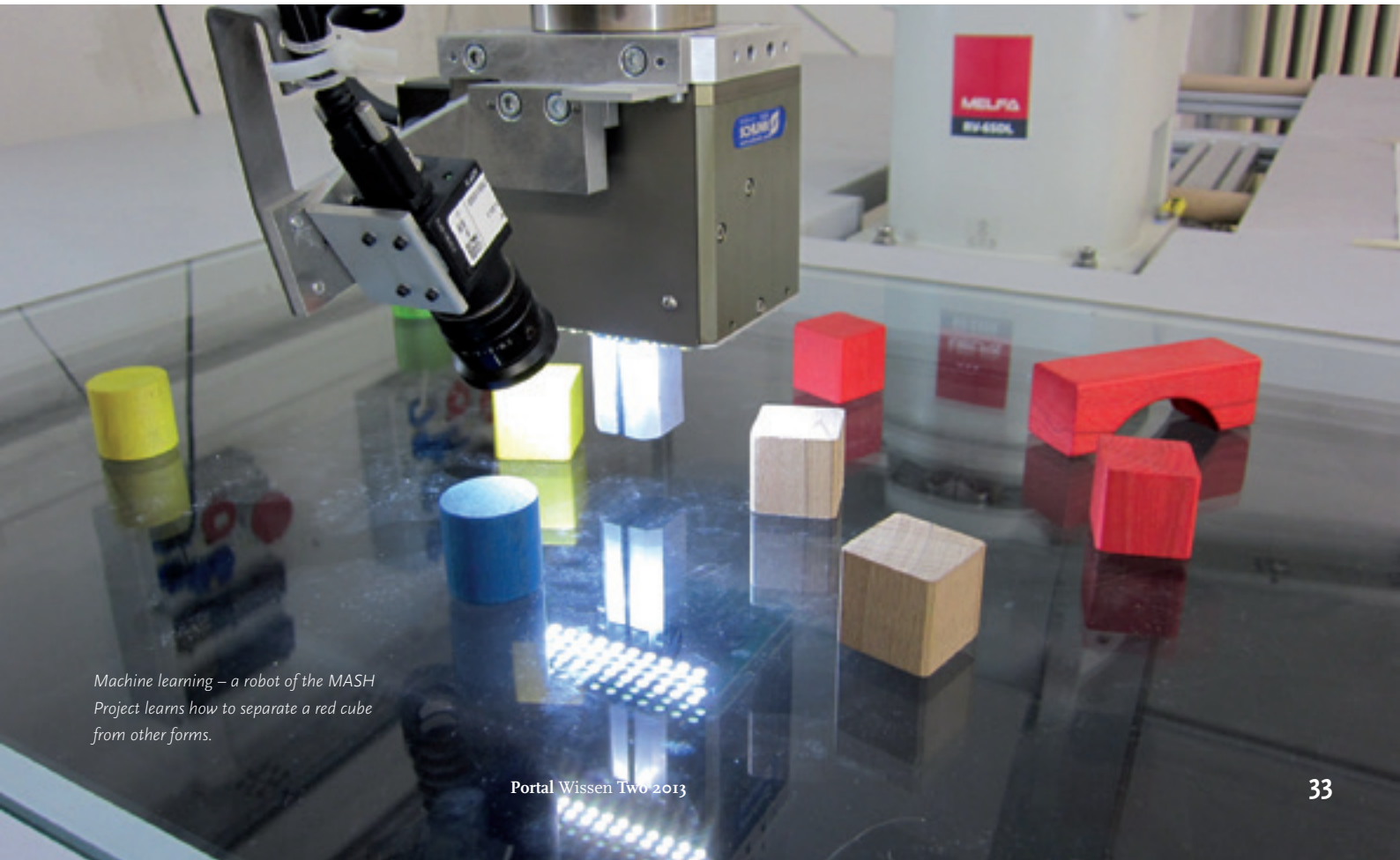

Machine learning – a robot of the MASH Project learns how to separate a red cube from other forms.

Drawing Up

BORDERS

Grenzziehung

Remnants of the Leh-Manali Highway, one of the main traffic routes in the north-west of India; heavy monsoon rain in 2010 caused catastrophic floods and landslides.

Tales as Old as the Hills

Geoscientist Oliver Korup Explores Natural Hazards

If earthquakes, landslides, floods and debris avalanches cannot be prevented, then people in the affected regions want to know at least how often such events might happen. Because these events are relatively rare but catastrophic, predicting them is one of the great challenges in geohazard research. The documentation of historical events is incomplete and based on just a few centuries. Using geological methods, scientists like Oliver Korup, Professor of Geohazards, can help to fill these gaps.

The number of scientists in the Brandenburg-Berlin region still impresses Professor Korup, which was the main reason he applied for a professorship in geosciences at the University of Potsdam. And he was successful. Since 2010 he has been teaching and researching here, since 2011 as a professor. After studying geography, geology and prehistoric archaeology in Würzburg and completing his PhD at the Victoria University of Wellington in New Zealand in 2003, he worked at the Swiss Federal Institute for Forest, Snow and Landscape Research. He has been following the geoscientific research in Potsdam for quite a while "that is marked by a great diversity of topics and is very visible internationally." He appreciates his colleagues, who helped make his integration smooth.

Korup knew very early that he wanted to study natural sciences. His decision for geosciences was closely connected with the "classical appeal of working outside in all weathers" and the constantly necessary creativity. After having worked as a business consultant, research and science proved to be much more attractive to him, although the "quest" for external funding hardly differs from "fundraising" in private business. This competitive process for funding and resources, however, also means "that research scientists do not live the unworldly life some people assume or communicate" and that the perception of "research living in an ivory tower" is clearly being chipped away at. His business experience has, therefore, proven extremely useful in his research work. Korup also does not rule out the possibility of providing expert opinions in the future.

"Predicting rare but catastrophic events is a great challenge in geohazard research."

At the University of Potsdam, Korup deals mainly with earth surface processes, with extreme events like mass wasting, landslides and sediment transport in rivers or natural dams. Outside the lecture hall, the scientist is often in the field, for example, in Pokhara in the Nepalese Himalayas. This very popular tourist destination lies on wide-ranging depositions of mudflows. The history of their formation remains relatively unexplored. Various dating methods have indicated that these deposi-

"Assessing the prospective frequency of floods, mass wasting or earthquakes."

tions are geologically very young, about 450–1,500 years old. "Evidence on repeated catastrophic aggradation interlocked with other processes emphasize the need for a thorough accounting of Pokhara's recent geological past. This would help us to assess the geological risks for the future much better," Korup says.

Many high mountains in Asia are characterized by strong earthquake activity, varying precipitation and high erosion rates. "Therefore, the main focus of our research work is to trace the history of events in sediment layers by analyzing depositions or landscape forms." This includes periods ranging from a few decades to several thousands of years. Geoscientists can look so far back because very rare, extremely destructive events leave their fingerprints on such geological archives. Examining soil layers and remains requires a high degree of precision. Findings in various scientific disciplines like geoarchaeology, physics, astronomy or mathematics are also necessary for an integrated understanding of events under and above the earth's surface and for concrete hazard assessments.

Drilling is a particularly efficient way of determining history out of sediment but is not always possible. This is why Korup and his colleagues examine additional archives: the opened sequences of stratigraphic layers at a particular location, the sequence of aerial and satellite photos or historical documents. They measure, record, analyze and interpret them. The individual layers are assigned to specific events or processes depending on their size and frequency. If a layer clearly belongs to a flood event, the scientists are interested in specifying the flood's date and extensiveness.

Rare but heavy rainfall in high mountain deserts, like here in Ladakh in the north-west of India, can trigger extreme and destructive floods. Sediment from past events allows for the prediction of the recurrence of such events as well as their frequency.

Sediment from an old natural dam not only provide information on past environmental conditions but can also suggest the possibility of spatial obstructions of a river.

The comparison of historical aerial photos is the easiest research method, but tree ring dating and examining isotopes or cosmogenic nuclides also reveal the secrets of such natural events. "We know from such archives: The bigger, more voluminous and stronger these events, the more rarely they happen," Korup says. The next step for the scientists is to establish models derived from their findings, for example, regarding the systematic relationship between size, power and frequency of the events. With their help and assuming the same environmental conditions, they can make predictions about the frequency of floods, mass wasting and earthquakes.

"Analyzing soil layers and the remains requires a high degree of precision."

Given the rarity of such dramatic natural events, the people living today cannot ask their ancestors about them. "You have to look back into geological history and look for potential 'silent witnesses' and for clues," Korup says. For example, in Japan they found warnings against settling in some areas affected by the 2011 tsunami were carved into stone. In Central Europe, historical, century-old sources are found more often. Geoscientific archives are especially important in those regions with fewer written records. "It is difficult to influence the results we will obtain prior to our research work. Of course, when analyzing natural hazards it is particularly impressive when the people benefit from our findings," the scientist explains.

DR. BARBARA ECKARDT

THE SCIENTIST

Professor Oliver Korup studied geography, geology and prehistoric archaeology in Würzburg. Since 2011 he has been Professor of Geohazards at the University of Potsdam. His special research interests are attributing climate and global change to natural hazards, quantifying related uncertainties and reconstructing extreme events with evidence from geological archives.

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Borderless View into the Universe

Professor Christian Stegmann Uses Gamma-Ray Telescopes to Look for Cosmic Accelerators

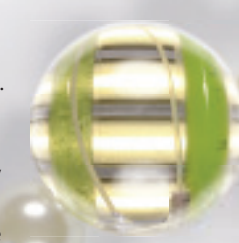
There is one appointment after the other. Christian Stegmann hurries down the corridor, a hard hat under his arm. There is a lot of construction work on the campus. Stegmann is head of the German research center Deutsches Elektronen-Synchrotron (DESY) in Zeuthen. Speed is part of the program here: accelerators and telescopes are used at DESY to explore the fundamental components and forces of the universe.

When Christian Stegmann talks about his work, he switches from a concentrated manager to a passionate scientist very quickly. His subject is physics of cosmic rays, the stream of ultra high energy particles that comes from outer space and constantly penetrates the atmosphere of the Earth and all living organisms on it. Stegmann and his colleagues are interested in identifying the sources of this radiation and how nature manages to accelerate the cosmic particles to such an enormous energies as would never be possible on Earth. Stegmann deals with these questions not only at DESY in Zeuthen, but now also at the University of Potsdam, where he holds a professorship for particle and astroparticle physics and where he is establishing a research group. A small team of scientists and PhD students will be working with the data of highly sensitive gamma-ray telescopes. "In the search for accelerators, we have witnessed a revolution over the past ten years," Christian Stegmann says enthusiastically about the new findings. These findings were mainly obtained with the help of the H.E.S.S. gamma-ray experiment in Namibia. The internationally-operated system of telescopes was named after the physicist Victor Hess who discovered cosmic rays 100 years ago and received the Nobel Prize in Physics for it. It has identified 60 new gamma-ray sources so far. Shock waves of huge stellar explosions are among these sources as well as magnetic and electric fields of pulsars. Driving forces are also in the vicinity of black holes in the cores of active galaxies.

"We have opened a new window to the universe with these gamma-ray telescopes," Stegmann says, who has been the spokesman of the H.E.S.S. experiment since this year and thus is somehow like the primus inter pares. H.E.S.S. is operated by about 200 scientists from 27 institutions worldwide. Stegmann is fascinated by kick-starting big things. His institute, for example, has designed and constructed the prototype of the enormous reflecting telescopes for the Cherenkov Telescope Array (CTA). This new kind of observatory will be searching for cosmic accelerators in the Northern and Southern hemisphere with more than 50 individual telescopes and with an unprecedented sensitivity. CTA will be able to capture and record more than 1,000 sources.

"For students at the university it is most interesting to be able to get access to such thrilling fields of research and international projects due to our cooperation," Stegmann says and also announces that young scientists of DESY will give seminars at the university in the near future. It is important to inspire the young academics, "to spark the flame". He himself was actively involved in teaching as a professor at the University of Erlangen-Nürnberg for many years. At present, he is supervising four PhD students, and the first student of physics from Potsdam started to work as a scientific assistant at DESY recently. Stegmann thinks that the cooperation with the university is a "good strategic decision" and is looking forward to common projects. "The Institute of Physics and Astronomy at the university and the Institute for Astrophysics make Potsdam a center of astro physics."

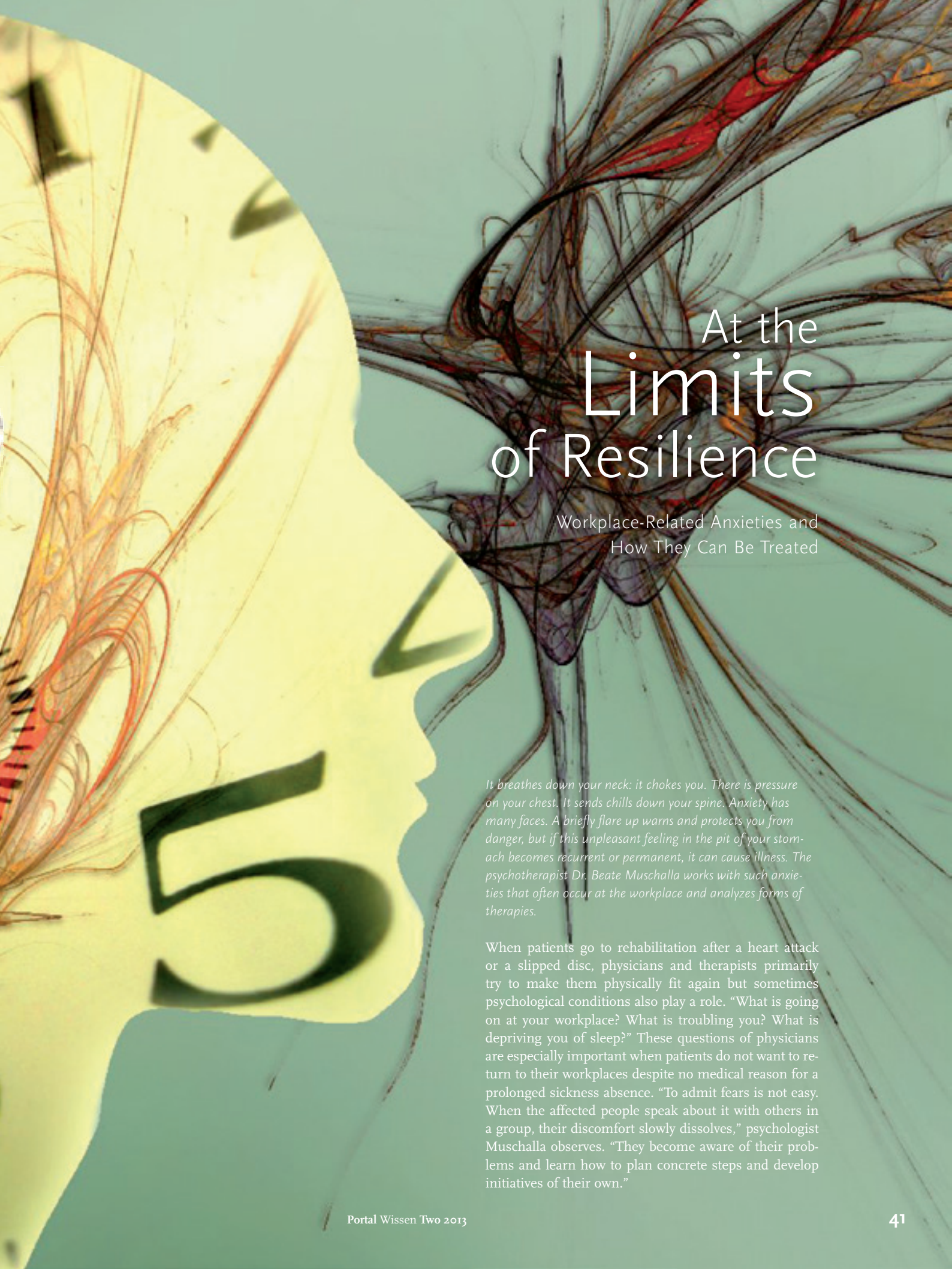
ANTJE HORN-CONRAD



PEARLS OF SCIENCE

Each of these research institutes is unique. Together they want to make better use of their potential. Eighteen leading scientific institutes in Brandenburg followed the University of Potsdam's initiative in 2009 and joined forces within "pearls · Potsdam Research Network". They want to use synergies dovetailing research and education even more closely. Furthermore, they want to raise third-party funds more successfully and develop fields of research geared to the future.

www.pearlsofscience.de



At the Limits of Resilience

Workplace-Related Anxieties and How They Can Be Treated

It breathes down your neck: it chokes you. There is pressure on your chest. It sends chills down your spine. Anxiety has many faces. A briefly flare up warns and protects you from danger, but if this unpleasant feeling in the pit of your stomach becomes recurrent or permanent, it can cause illness. The psychotherapist Dr. Beate Muschalla works with such anxieties that often occur at the workplace and analyzes forms of therapies.

When patients go to rehabilitation after a heart attack or a slipped disc, physicians and therapists primarily try to make them physically fit again but sometimes psychological conditions also play a role. "What is going on at your workplace? What is troubling you? What is depriving you of sleep?" These questions of physicians are especially important when patients do not want to return to their workplaces despite no medical reason for a prolonged sickness absence. "To admit fears is not easy. When the affected people speak about it with others in a group, their discomfort slowly dissolves," psychologist Muschalla observes. "They become aware of their problems and learn how to plan concrete steps and develop initiatives of their own."

The University of Potsdam researcher evaluates group psychotherapy for people with work-related anxieties. She does not do it, as you might assume, in a psychiatric-psychotherapeutic clinic but rather in neurology, cardiology and orthopaedic departments at Brandenburgklinik Bernau. Empirical studies show that about one in three patients with somatic illnesses also suffers from psychological problems. The source of such problems is quite often at the workplace. Sometimes chronic backache can conceal an oppressing stress and cardiac arrhythmias can mask a long, agonizing fear of failure.

"About one in three patients suffering from a somatic disease also has a psychological problem."

When patients are admitted to the rehabilitation clinic, Muschalla interviews them in diagnostic sessions to identify such underlying connections. For this she uses a Job Anxiety Scale she has developed herself. "The workplace," she explains, "is a field of life with permanently changing structures, increasing requirements and new technologies. This demands a high degree of flexibility and adjustment. Permanent supervision and sanctions by superiors or rivalry among colleagues can trigger additional fears. In some professions, health and accident hazards are additional, real threats." This can lead to anxiety disorders. The affected, the psychologist says, react with agitation, panic attacks, excessive worry or social anxiety.

If Muschalla observes such symptoms during her diagnostic interview sessions, she will recommend a behavioural group therapy offered by the clinic. As a supervisor, she takes part in the sessions of psychotherapist

Beate Muschalla looks for the causes of anxieties that afflict people at their workplace.

Hadice Ayhan. The patients learn to speak about their fears, develop coping strategies and actively tackle their problems. At the end of the therapy and six months after their stay in the clinic, they are interviewed again: What has changed in your life? Which initiatives have you already taken?

To check the efficiency of the behavioural therapy, Muschalla compares it to a second group therapy that focuses on distraction, leisure activities and pleasure. The hypothesis is that those patients who do not repress but intensively deal with their fears and constructively work on solutions of their problems can return to their everyday working life earlier. This is indeed the aim of rehabilitation in most cases.

Social interest in this matter is growing because job-related anxieties play an increasingly important role in explaining long-term inability to work and early retirement. Contrary to public perception, the prevalence of psychological illnesses is not increasing. "It has remained stable, affecting 30 per cent of people for some decades," the psychologist explains. "The working conditions, however, have changed. They make it more difficult for people with psychological problems to handle the challenges of day-to-day work." Constant availability, continuously being overloaded, accelerated work routines through ever-faster information technologies and computerized controlling mechanisms push them to their limits. "The repeatedly attested burnout syndrome is not a diagnosis though," the researcher clarifies. Behind the assumed burnout there is often latent depression or an anxiety disorder that appears under extreme pressure. "Nevertheless, some patients tend to more readily accept burnout as a reason for being on sick leave. Unfortunately, there is still a stigma attached to anxiety disorders and depression," the psychologist says.

Muschalla thinks that a prospective solution is to strengthen patients in their skills during therapy and afterwards to find or organize a work environment suited to their capacities. This also means talking openly to their employer or superior about the problems. "Not everybody has to be able to do everything," the psychologist says, "but everybody can be employed according to his or her strengths." Individual weaknesses can then be much more easily tolerated in a team. Similar to inclusion in education: meeting the strengths, weaknesses and limitations of children, we also need inclusion at the workplace. We need problem-compatible jobs for 30 per cent of the working population, for those people suffering from psychological illnesses."

"Unfortunately, there is still a stigma attached to anxiety disorders and depression."

Muschalla has been dealing with work-related anxieties since her diploma thesis, a hitherto hardly studied research field. There have been only a few studies about it worldwide. It is beyond dispute that untreated fears can develop into phobias, which make it seem impossible for the affected people to ever return to their workplaces. Muschalla did her PhD on this topic and knows about the necessity of efficient therapies. She regards it a great advantage to be able to do her research in a practice, thanks to the association with the rehabilitation clinics. The evaluation of the group therapy is a real interface project that is equally supported and managed by the neurologist Professor Michael Jöbges, Medical Director of the Brandenburgklinik, and Professor of Work and Organizational Psychology Doris Fay at the University of Potsdam. So far, Muschalla has conducted diagnostic interviews with 800 patients and has treated 150 of them. Next year, the examinations shall be completed. The results will show which therapeutic concepts are most suitable to holding patients' fears at bay and supporting their return to work.

"Not everybody has to be able to do everything but everybody can be employed according to his or her strengths."

ANTJE HORN-CONRAD

THE SCIENTIST

Dr. Beate Muschalla studied psychology at the Freie Universität Berlin until 2006. She received her license as a psychological psychotherapist in 2010, specializing in behavioural therapy. For 10 years, she has been working in vocational rehabilitation research. She received her PhD from the University of Potsdam in 2008 with her dissertation "Workplace-related Anxieties and Workplace Phobia". Since 2012, she has been a research scientist at the Department of Work and Organisational Psychology at the University of Potsdam working on the project "Treatment of workplace-related anxieties in a group psychotherapy", funded by Deutsche Rentenversicherung (the German statutory pension insurance scheme) at the Research Association for Medical Rehabilitation.

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BORDER

Crossing

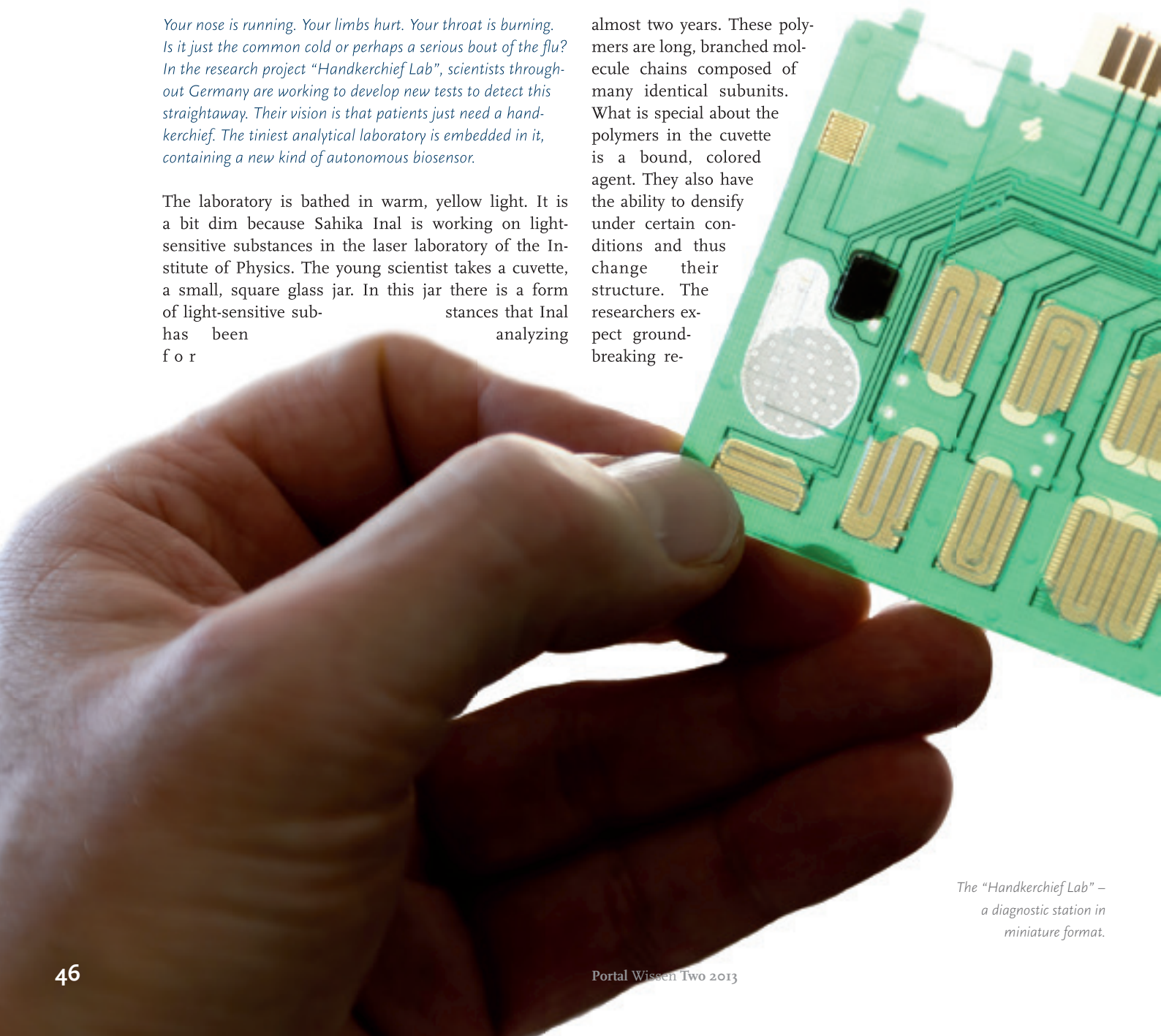
Grenzüberschreitung

Signals from the Hankie

Extensive Research Network on a Micro Laboratory

Your nose is running. Your limbs hurt. Your throat is burning. Is it just the common cold or perhaps a serious bout of the flu? In the research project "Handkerchief Lab", scientists throughout Germany are working to develop new tests to detect this straightaway. Their vision is that patients just need a handkerchief. The tiniest analytical laboratory is embedded in it, containing a new kind of autonomous biosensor.

The laboratory is bathed in warm, yellow light. It is a bit dim because Sahika Inal is working on light-sensitive substances in the laser laboratory of the Institute of Physics. The young scientist takes a cuvette, a small, square glass jar. In this jar there is a form of light-sensitive substances that Inal has been analyzing for almost two years. These polymers are long, branched molecule chains composed of many identical subunits. What is special about the polymers in the cuvette is a bound, colored agent. They also have the ability to densify under certain conditions and thus change their structure. The researchers expect groundbreaking re-

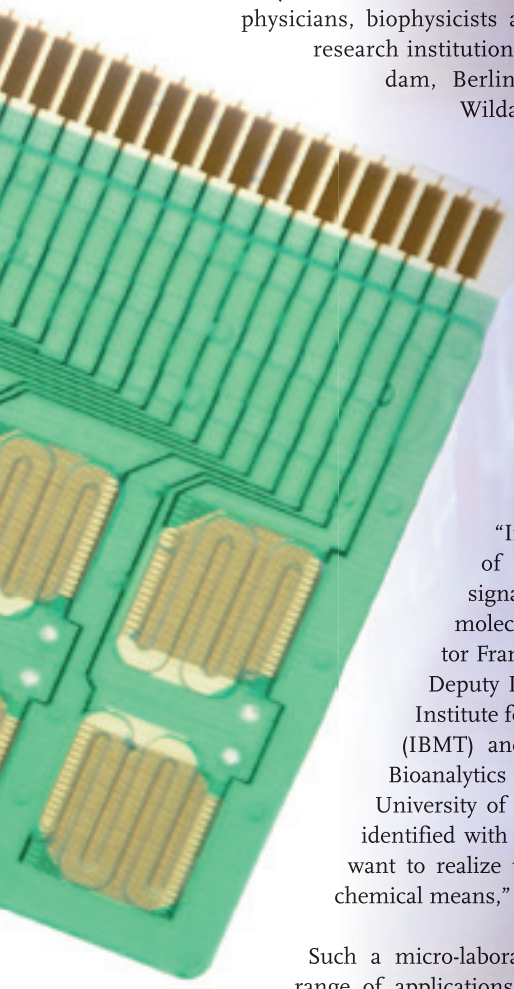


The "Handkerchief Lab" – a diagnostic station in miniature format.

"Biosensors should indicate whether a patient has the common cold or suffers from a dangerous flu infection."

sults from these two properties. In the future, the polymers, as components of new types of biosensors, could indicate within a very short period whether a patient has the common cold or is suffering from a dangerous flu infection. For this, he or she has only to blow his or her nose into a tissue. If the bound chemical substances show a color change, it indicates an influenza virus, at which time it is advisable to see a doctor.

Since 2009, scientists from various disciplines have pursued this aim. Under the leadership of the University of Potsdam, about 70 chemists, physicists, physicians, biophysicists and biochemists from 14 research institutions and enterprises in Potsdam, Berlin, Braunschweig, Teltow, Wildau and Bochum have been researching together in the "Handkerchief Laboratory" to develop an analysis laboratory literally the size of a tissue. The German Federal Ministry of Education and Research funding of the projects has totalled 15 million Euros.



"In principle, identification of a certain structure and signalling will be linked on a molecular level," project director Frank Bier summarizes. He is Deputy Director of the Fraunhofer Institute for Biomedical Engineering (IBMT) and Professor of Molecular Bioanalytics and Bioelectronics at the University of Potsdam. "The germs are identified with biochemical methods. We want to realize the signalling by physicochemical means," Bier says.

Such a micro-laboratory would offer a wide range of applications. You would not only be able to detect influenza viruses quickly and easily, but the system could also be used in diapers to identify dangerous intestinal pathogens like salmonella or noroviruses. Built-in wipes, the sensors would indicate whether surfaces in hospitals or nursing homes are contaminated with antibiotic-resistant germs. They could even imagine using them in the catering industry, Bier explains.

Fluorescent polymers.

Our body's immune system shows us how to biochemically recognize pathogens. The surfaces of viruses and bacteria have particular protein target structures. Cells of the immune system recognize the exogenous intruders due to these suspicious proteins. They produce antibodies that bind the pathogens with the help of molecular structures and render them harmless. The protein structure of each pathogen is different and so is the attachable structure of the antibody. "We want to analyze and recreate the binding structure of antibodies," Professor Bier explains. Exactly these binding sites shall be assembled in a new molecule, a kind of artificial antibody. Then there is not only one but several binding sites. This creates a highly effective and strong connection between pathogen and molecule. If the biosensors are integrated in a handkerchief, influenza viruses can bind to them biochemically. "The next step is to connect this binding process with an action. We want to get a signal," Bier says.

"We want to analyze and recreate the binding structure of antibodies."

THE PROJECT

"Taschentuchlabor"

In addition to the University of Potsdam, 13 other research institutions and enterprises from Germany participate in the project, among them the Fraunhofer Institutes of Biomedical Engineering (IBMT) and of Applied Polymer Research (IAP) in Potsdam-Golm.

Duration: 2009 – 2014

Funded by: Ferdal Ministry of Education and Research, Program "Cutting-Edge Research and Innovation in the New Laender"

www.taschentuchlabor.de

Here is where Sahika Inal's polymers come into play. Professor Dieter Neher, head of the research group "Soft Matter Physics" at the Institute of Physics and Astronomy, has been studying these versatile chemical

Sahika Inal examines how the biosensors react under specific conditions.

compounds for a long time and is taking part in the research of the handkerchief lab. He and his PhD student Inal have the task of finding out in which way the docking of the pathogen to the binding site could create an optical signal. For this you need certain prerequisites. "The idea is to have a polymer with a colorant and a binding site for the pathogen," Neher explains. At the same time, the polymer has to be able to change its structures. If the binding sites are free, the molecular structures should be loose and well-permeable. If pathogens connect to them, the polymer will contract. The structure becomes denser and more impermeable. Smart polymers or functional polymers is what the experts call such variable molecules. Finally, colorants should make the changes visible. For this matter, the physicists are collaborating with chemists at the University of Potsdam and the Fraunhofer Institute of Applied Polymer Research (IAP). In chemical labs, the polymer chains are assembled; binding sites and colorants are added. Then the physicists test the properties of the synthetized polymers.

Inal holds in her hand a styrofoam box with many cuvettes containing samples of different polymers. The researcher exposes them to bright light in the dimmed laboratory. Some of the samples start to glow white. "The fluorescence shows that the polymers are loose," she explains. The scientist spent many hours in yellow light looking for the appropriate polymer. At the microscope, she examined whether the colorants are evenly distributed in the polymer. Using a Ti:Sapphire Laser, she tested at which wavelength the polymers fluoresce. She experimented with different polymer concentrations, colorants, temperatures and salts to find out under which conditions the molecule chains thicken. After a lot of trial and error, she finally found it – the polymer that indicates its structural change by a change of color. "At last," she says with a smile.

"Smart polymers or functional polymers – this is what the experts call such variable molecules."

A blue luminescent colorant is integrated into the molecule chains of this polymer. Another, green luminescent colorant floats freely in the surrounding solution. If the polymer is loosely packed, the two colorants can come into contact. The solution fluoresces green. If the polymer is compact, it fluoresces blue because the green colorant has been excluded. These research results are a milestone in the optical detection of pathogens, even if the polymer has only changed from the loose to the compact state by changing the temperature and adding salts so far. "The next goal of our research is to provoke the same reaction through the binding of a pathogen," Neher explains.

There is another challenge for the researchers. To bind the polymers to a solid substance, for example to a cellulose fibre, the polymers have to be able to attach to surfaces without losing their defining properties. At present, the molecule chains float freely in a solution. To bind them to a carrier substrate, the surface of such substrate has to be chemically adjusted. Inal will, therefore, be spending many more hours with experiments, testing under dim yellow light.

HEIKE KAMPE

THE SCIENTIST

Professor Frank Bier studied physics and mathematics in Münster, Heidelberg and Munich. Since 2003 he has been Professor of Molecular Bioanalytics and Bioelectronics at the University of Potsdam. In 2006 he became Director of the Fraunhofer Institute of Biomedical Engineering (IBMT) branch in Potsdam-Golm. He is director of the research project "Handkerchief Laboratory".

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Professor Dieter Neher studied physics in Mainz, where he also completed his PhD in 1990. Since 1998, he has been Professor of Soft Matter Physics at the University of Potsdam and explores optical, electrical and optoelectronic properties of thin polymer films.

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M. Sc. Sahika Inal studied textile engineering at the Istanbul Technical University. In 2007 she came to the University of Potsdam and studies in the Master's program Polymer Science. At present, she is writing her PhD thesis about "Smart Polymers" at the Institute of Physics and Astronomy.

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Off to New Systems

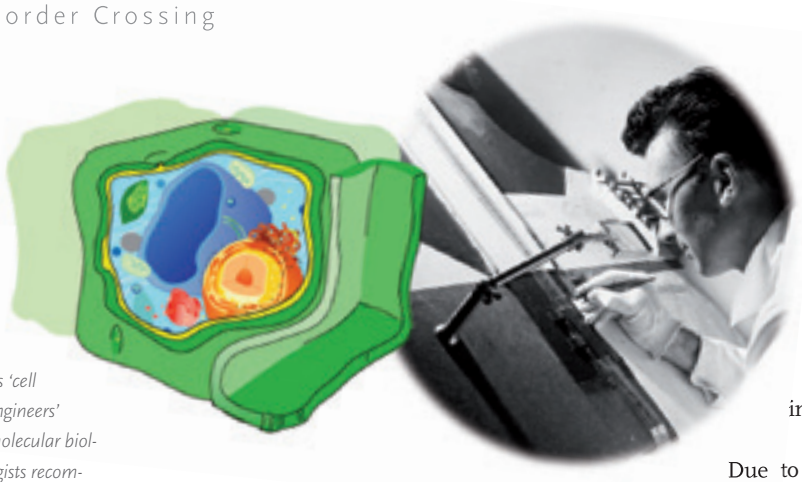
Biologists from Potsdam Think about Biotechnological Applications

Synthetic biology is among the latest technical developments in modern sciences. It has huge innovation potential and combines a broad spectrum of scientific disciplines, like biology, chemistry, physics, mathematics, biotechnology, engineering sciences and computational science. In synthetic biology approaches, both basic and applied research benefit from this integrated multidisciplinary work. One of those who intensively deal with synthetic biology is Bernd Müller-Röber, Professor of Molecular Biology at the University of Potsdam.

Synthetic biology builds on and develops the findings and methods of molecular biology. Research scientists alter biological systems and combine them with chemically synthesized components to form new units. This creates biological components or even new organisms that do not occur in nature in such a form. Because research in synthetic biology is mostly solutions-based and / or application-oriented, it comprises a huge potential capacity of innovation features and future applications in all areas of life. For example: A statement by the German Research Association, the National Academy of Science and Engineering (acatech) and the German National Academy of Sciences Leopoldina says that they expect important findings "that will sustainably influence the development of new pharmaceuticals and therapeutic procedures as well as the production of industrial chemicals and the concentration of catalytic processes." This would also allow for the creation of organisms that can survive only under controlled conditions.

This may cause the impression that the scientist becomes a designer of molecules, cells and organisms. However, the reality shows, that "scientists are far away from creating something like artificial life forms in their laboratories", Müller-Röber says. They rather deal with basic research of microorganisms as well as new approaches in medical sciences. In fact they e.g. try to create artificial, biochemical systems integrated into living organisms, which thereby take on new, useful properties. In addition, the scientists create chemical systems according to existing biological models in such a way that they possess specific characteristics of living organisms. As for the future, emphasis lies in biotechnological applications, like better diagnoses, vaccinations and pharmaceuticals or in developing new biosensors, biomaterials and biofuels.

On the way towards a new "super science"? Synthetic biology connects various disciplines with each other.



As 'cell engineers' molecular biologists recombine existing structures.

In addition to synthetic biology, everyone these days is also talking about genetic engineering which both stoke fears. In order to resolve potential fears, Dr. Susanne Hollmann, coordinator of the Focus Area of Plant Genomics and Systems Biology, likes to disarm these two terms: Synthetic biology is just a new term for molecular-biological methods that express the further development of technology. For example, in the broadest sense, even plant breeding is synthetic biology. "You combine two plants methodically, which would not come together in nature and force fertilization and reproduction, thereby manipulating a genome and creating something new." Thus, synthetic biology already benefits from biotechnological tools that use, enclose, combine or reduce existing structures. Nevertheless, like in any other science, findings might be misused, e.g. by headlines in the media like "Rebirth of the Neanderthal". The American molecular biologist George Church believes that the Neanderthal could be brought back to life with the help of synthetic biology. He said it would just take an adventurous woman to carry the embryo as a surrogate mother.

"Our mission is to have an open and transparent discussion about our research work."

As a consequence of such "adventures", this scientific discipline has not been without controversy. In addition to economic opportunity and scientific progress there are unforeseeable and undesirable consequences in this context of research, like in many other fields, "As scientists, it is our responsibility to assess risk and opportunity as well as to have a transparent and open debate about our research, its results and applications," Müller-Röber says.

Thus, research groups at the University of Potsdam and their partners make important contributions to the advancement of research in synthetic biology for the benefit of society. Among them is the newly appointed junior research group "Synthetic Biosystems – from Cell to Fabrication". This group, headed by Dr. Katrin Messerschmidt, is developing a new cellular element for a controlled production of proteins and peptides by using yeast-based chromosomes. The long term goal is the production of new chromosomes that encode the enzymes required for different, especially pharmacologically active molecules. The aim is to apply these modules in the production of so-called multi-enzyme machines, used, for example, in the production of pharmacologically interesting peptides, new functional units for next-generation biotechnological procedures or in the production of proteins for in-vitro administration. The production of technically interesting chemicals is also possible in this way.

Due to the enormous biodiversity of plants in Latin America, colleagues from Brazil and Columbia are among the most important partners of the Potsdam scientists in the context of synthetic biology. There are plants that produce small amounts of substances similar to antibiotics. This is of great interest for synthetic biology research. Thus, one of the tasks and benefits of synthetic biology is altering plants in such a way that their biomass increases or producing larger amounts of specific substances for the chemical or pharmaceutical industry.

The Workshop "Molecular Interactions – Next Generation Biotechnology" is part of this collaboration between the Potsdam-based scientists and their international colleagues. It took place in Potsdam in August of this year. This is an opportunity for young academics to not only gain insight into the latest trends, technologies and analytical approaches in biotechnology, but also to establish new contacts with experts from universities, research institutions and enterprises from Germany, Europe and beyond.

DR. BARBARA ECKARDT

THE SCIENTIST

Professor Bernd Müller-Röber studied biology and philosophy in Tübingen, Marburg, and Berlin. Since 2000 he has been Professor of Molecular Biology at the University of Potsdam.

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In the Course of *Life*

LifE-Longitudinal Study Records Living Conditions across Generational Borders

There is something fascinating about chronicles: Like in fast motion, you can relate to events, how conditions and relationships have changed and the people along with them … An excellent example is the documentary "The Children of Golzow", a longitudinal observation of a school class in the Oderbruch region. The children were filmed for over five decades on their paths towards and during adulthood. Researchers from Potsdam, Zurich and Constance followed the lives of about 1,400 school children using empirical social research methods. Their longitudinal study "LifE" is entering its fourth decade.

It all began at the University of Constance in 1979. A team led by the Austrian professor of pedagogics Helmut Fend conducted its first large survey in German schools. About 2,000 school children in Frankfurt/Main and from two rural regions of Hesse took part. Between the ages of 12 and 16 they were interviewed every year about family, friends, leisure time, their opinions and emotions. Their parents and teachers received questionnaires as well. This made it possible to compare the conditions of children growing up in a metropolis with those in the countryside.

The youth survey seemed complete when the data had been evaluated and the results had been published. But around the turn of the millennium the scientists asked themselves what had become of the children. How did they fare on their way into adulthood? Did they reach their intended careers, get married or start a family? The idea for "*LifE*" was born, the study, which should trace the "pathways of life into early adulthood". New to the research team was Wolfgang Lauterbach, today professor for Social Scientific Research on Education at the University of Potsdam. He recalls how the members of the team put in a huge investigative effort in order to find the former students via the still available addresses of their parents. "Even though we already had internet at that time there were no search engines. Hence, missing addresses had to be researched intricately." But the effort paid off: More than three quarters of the former subjects took part in the follow-up survey in 2002. During the third survey last year still 1,367 people had themselves questioned about parent and partner relations, friends and family, job, attitudes and orientations.

By now, three generations have been interviewed in the LifE*-study.*

"The apple did not fall far from the tree." The study indicates that the development of children and young adults is influenced by their parents in many different ways.

What are the results of this longitudinal study? What have the sociologists found? Were there any surprises? "It is our aim to show how experiences made during adolescence, in the parental home, at school or with friends influence a person's later development. We want to predict career paths, the development of partnerships and relationships between generations – resulting from the experiences of one's youth," says Lauterbach, explaining it using the example of the school career. Almost 70 per cent of all participants in the study finished school with exactly the degree their parents had expected from them at the age of 13, although it did sometimes take a bit longer. According to Lauterbach, the pressure of parents' expectations often continues to affect young people into young adulthood. Parents extensively influence religiousness, political attitudes and cultural activities like reading and playing music. However – and this is one of the surprises – this so-called cultural capital has hardly any impact on professional success. Multiple qualifications, however, contributed significantly to the "educational advantage" of high school graduates among the participants over the course of their professional careers. School graduates with lower qualifications rarely decide to start a second vocational training. The sociologists were not surprised by the high value of family, a normal part of most people's lives. Thirty-eight per cent of those interviewed even married their first partner. Almost 50 per cent of them chose their second or third partner. Regarding relationships, the *LifE*-study shows that many couples live together as relatively equal partners at the beginning, but tend towards a traditional division of labor after having their first child. Especially those who grew up in the countryside live by the rules they perceived as normal in their childhood. Women with a longer school education and higher income are often together with men who engage more actively in household chores. They often expressed these wishes even as adolescents, says Lauterbach, thus confirming the significance of early attitudes on later life. The same is true for an early positive self-perception, which also has an effect on health. An interesting result of the study is that those adults who developed a high self-esteem show less depressive moods. Lauterbach says that one of the great advantages of longitudinal studies is the possibility to describe and represent such correlations.

"It is our aim to show how experiences during childhood and youth, at home, school and with friends influence later development."

Since 2007, the *LifE*-study has been based at the Faculty of Human Sciences at the University of Potsdam with Professor Wolfgang Lauterbach and has been continued in collaboration with the universities in Constance and Zurich. The once adolescents are now 45 years old. They are in the middle years of their lives, have children of their own, who are now at the age they were when they were first interviewed. "This was a chance to integrate a third generation into the study," Lauterbach says. In fact, 580 young people responded when asked to answer the questions their parents had been asked more than 30 years ago. "For the first time in German-speaking countries, several generations can be compared within the scope of one life course study."

Although the data have not been completely evaluated, the initial results are already becoming apparent. The changes in educational opportunities are especially impressive. Among the grandparents, just 15 per cent of men and seven per cent of women had the opportunity to get a general qualification for university entrance. Among their children it was already one third in a cohort with an equal distribution between men and women. What about the generation of grandchildren? More than 60 per cent now attend grammar school. They experience their school time much more positively than their mothers and fathers. The majority felt that they

THE PROJECT

***LifE* – Pathways from Late Childhood to Adulthood**

is a joint project of the universities in Potsdam, Constance, and Zurich. Funds are provided by the German Research Foundation (DFG) and the Swiss National Fund (SNF)

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were taken seriously by their teachers. In the 1980s, 36 per cent of the school children at that time stated that teachers did not show the children up. Today 76 per cent are of this opinion. According to the researcher, the assumptions that discipline has decreased among school children and that teachers have to put up with more today were not confirmed. In the first round of surveys, just 23 per cent of the former eighth-grade students said that they had never been mean to their teachers. Forty-eight per cent of their children said that they had never done so. Fewer adolescents play truant today than 30 years ago.

To be able to describe the school experiences more precisely, the researchers asked the participants back then and today about their stress, their overload or underload. The results are quite surprising: The time required for homework has slightly decreased. The sociologists assume that this is due to the fact that more young people attend an all-day school. Contrary to public perception, school children do not have to handle a higher amount of work for school than in the past. Nervousness and the stress to perform have instead shown a downward trend. The researchers cannot find any evidence for the often-criticised overload of today's school children in their results. The direct comparison of generations instead shows that the parents have not passed their own stress experience onto their children. There is just one aspect in this context: "Parents who did a lot of homework themselves have children who do this as well. The diligence of the parents seems to be conveyed to the children to a limited extent," according to a first evaluation of the current interviews.

"There are even LifE-parties meanwhile where the school classes once interviewed meet again."

Results of the *LifE*-study are regularly being published and relayed to the participants. "Many of them are really proud to be a part of it," Lauterbach says. "There are even *LifE*-parties, where the school classes once interviewed meet again," the social scientist says. Although people sometimes have taken different paths in life and experienced personal tragedies, the contact between the generations is still quite close. Participants have repeatedly expressed the hope that the study will be continued for the next 10 or 20 years. "Then we would have a complete life course," Lauterbach says. They are presently analyzing and publishing their latest data. In 2014, there will be a conference about these results. A follow-up application has already been submitted to the German Research Association.

ANTJE HORN-CONRAD

THE SCIENTIST

Professor Wolfgang Lauterbach studied sociology at the Freie Universität Berlin where he also received his PhD in 1992. His post-doc qualification at the University of Constance was followed by research periods in the USA and in Switzerland. There he worked with Helmut Fend at the LifE-project. In 2002 Wolfgang Lauterbach became Professor of Family, Education and Life Course Research at the University of Münster and in 2007 Professor of Social Scientific Research on Education at the University of Potsdam.

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The third generation of the LifE-study does not have to be the last one. The project goes on.


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