University of Basel

UNI NOVA

University of Basel Research Magazine — N°125 / Mai 2015

Research in the Spirit of Sustainability

For a Future With a Future.

In conversation
Better understanding of animals.

Debate
When is a person dead?

Research
Microfactories in the body.

Album
Excavations in the Valley of the Kings.


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Team

This edition was created and produced by:

1

2

3

4

1 Following her Bachelor's degree (Economics and Media Studies) at the University of Basel, **Stephanie Stähli** completed a Master's in Mass Media and Communication Research in the University of Fribourg. Since October 2014, she has worked as an intern at the Communication & Marketing department with joint responsibility for the relaunch of the UNI NOVA magazine.

2 After studying Biology in Basel, **Thomas Pfluger** maintained his involvement in science both as a freelance journalist and a director of Gsünder Basel and the Stiftung Wissenschaftliche Politikstipendien. In this edition, he was responsible for the dossier on sustainability. 14, 24, 28

3 **Urs Hafner** studied History and Sociology in Bern. Today, he works as an historian and journalist for, among other publications, the Neue Zürcher Zeitung. As an external consultant, he has supported the relaunch of UNI NOVA and interviewed Markus Wild on the subject of animal philosophy. 6

4 Photographer **Matjaz Kacicnik** grew up in Slovenia and today lives in Cairo. He specializes in the documentation of archaeological excavations and took the impressive sets of photographs of the excavations in the Valley of the Kings for UNI NOVA. 48

The key to the future.

The University of Basel defined the thematic focal area Sustainability and Energy Research in its strategy for 2014–2017. It is my pleasure to introduce this issue of UNI NOVA, which showcases our activities in this important and rapidly developing field.

When the area was first identified, there was some degree of head-scratching among my colleagues. Reactions were often along the lines of "but we do not do anything in this area" or "but we do not have an engineering school".

The theme is so broad that it is genuinely all things to all men and provides an interdisciplinary platform that brings social scientists, economists and natural scientists together in a common forum. This is a unique feature of the Basel landscape, allowing us to build on our traditions of excellence in diverse disciplines.

The aim is both strategic and tactical. Tactical in the sense that we will be better placed to respond to opportunities for external investment in fields that are identified as being of national and international priority. The Competence Center for Research in Energy, Society and Transition – CREST – indicates the success of this approach. Strategic in that it allows us to develop cohesiveness in an area in which we are very successful with activity that is diffuse and dispersed among a range of departments and faculties. The focal area provides a central structure to coordinate interdisciplinary research, building on the strengths of our university, and I look forward to even more exciting developments in the future.

In the meantime, enjoy this issue of UNI NOVA, which will give you a taste of the activities of our university. Sustainability is the key to the future.

Professor Edwin C. Constable
Vice Rector for Research


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Dossier

For a Future With a Future.

UNI NOVA
is also available in German and online:
www.issuu.com/unibasel
www.unibas.ch/uninova

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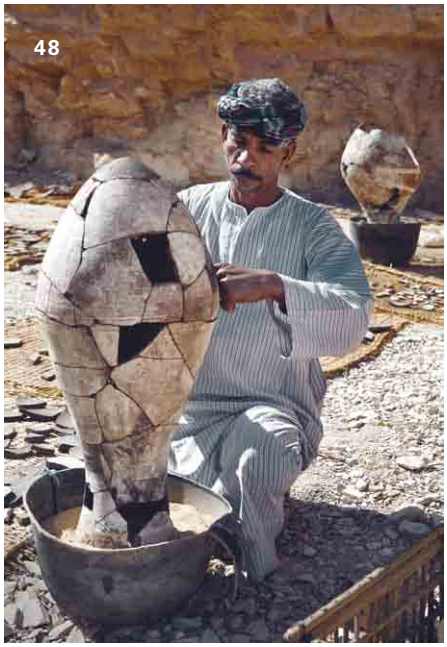

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EDITORS: Matthias Geering, Reto Caluori, Stephanie Stähli

POSTAL ADDRESS: UNI NOVA, University of Basel, Communications & Marketing, Postfach, 4001 Basel.

Tel. + 41 (0)61 267 30 17
Email: uni-nova@unibas.ch
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COVER PHOTO
Professor Ansgar Kahmen and research associate Cristina Moreno Gutierrez investigate how plants are reacting to climate change. To help them in their work, they also use herbaria from the 19th century. Read more about their research on page 19.

Cambridge Science Festival

Getting a grasp of cell biology.

A real eye-catcher at this year's Science Carnival in Cambridge, Massachusetts: a blow-up cell on show for two days in the Boston region presented by Basel University. Enlarged to 300,000 times its actual size, it allows researchers to investigate what is usually impossible to see with the naked eye. Those who come into contact with the cell can learn a huge amount about the smallest units of life.
facebook.com/TheGiantCell

Skeletons in St. Johanns Park

The site of today's St. Johanns Park was once the graveyard of Basel's public hospital back in the 19th century. Archaeology students were right at the heart of the action in recovering historically significant skeletons and graves.

New construction

New premises for aspiring department.

An attractive design (see photo above) produced by architects Caesar Zumthor and Markus Stern from Basel in January 2015 won them the competition for the construction of new premises for the Department of Sport, Movement and Health (DSBG) at the University of Basel. These new premises will be built behind the St. Jakobshalle in the Brüglinger Ebene. The preliminary project is currently being developed and, in a parallel process, the required planning proposal is under consideration by the cantonal authorities and should be approved by the Münchenstein municipal assembly in September.

Understanding animals from their appearance.

As a philosopher focusing on animals, Markus Wild often meets with a positive response outside the university. He believes that philosophy helps people to gain a better understanding of animals – and that we see evidence of this across the world.

Text: Urs Hafner Photo: Basile Bornand

URS HAFNER: Professor Wild, for biologists man is just one kind of animal among many, while sociologists perceive a number of differences between humans and animals – language, the state or the law, for example. What do you say as a philosopher?

MARKUS WILD: I share biology's view on this. Like all other animals, man can be explained in evolutionary terms. Again like them, he has developed particular characteristics that he alone possesses. However, thanks to his use of complex communication, his social skills and his ability fundamentally to reshape his environment, he has developed a high-level feedback structure that allows him to change himself in important ways. That sets him apart and explains how he has attained his special position. However, there is no single quality, such as rationality, that separates human beings decisively from animals.

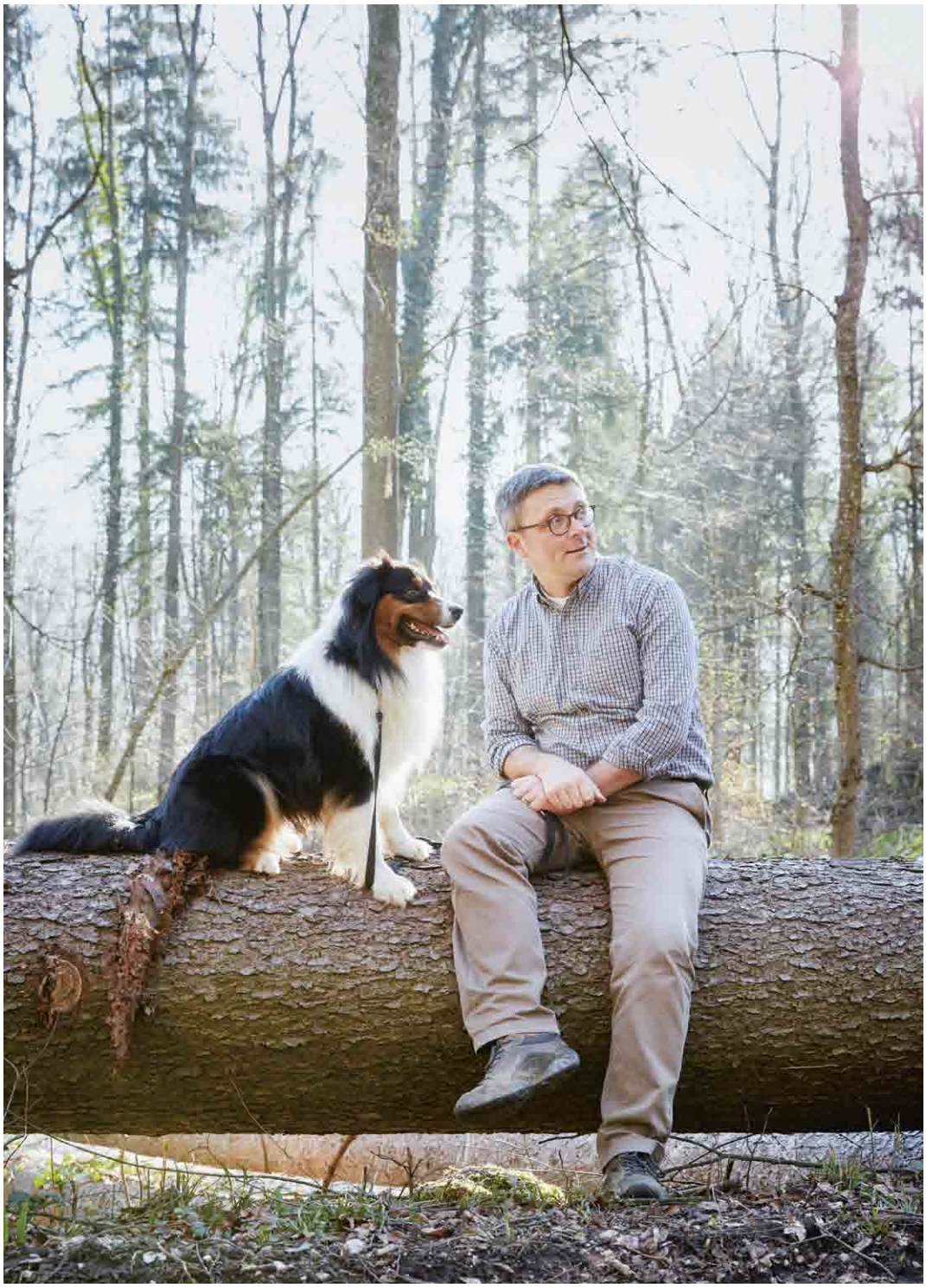
HAFNER: So you see man as an animal, rather than the pinnacle of creation. Is that a break with philosophical tradition?

WILD: No. Spinoza, David Hume and Friedrich Nietzsche all stressed that too much was made of the differences between humans and animals. Spinoza says that within nature man does not constitute an independent state within a state. For Nietzsche, all living things are clusters of organized drives. What sets man apart is his unique ability to prioritize one drive – in the scientist's case, for example, curiosity and what Nietzsche called the will to truth – over all the others.

HAFNER: It is not only philosophy that is eroding the differences between humans and animals. Vegans and supporters of animal rights call for animals to be given moral and legal equality. Until recently we wanted to wipe out wolves and bears, but now they enjoy state protection. Is the west on the verge of a paradigm shift?

WILD: It is difficult to look into the future, but I think so. We see these kinds of processes at work across the globe. In several countries, great apes have been accorded rights of personhood. A court in Argentina ruled that keeping an orang-utan in a zoo amounted to imprisonment. Support for animal ethics is taking a political turn. We can see that happening in Switzerland, too. Vegetarians and vegans may account for only about 5% of the population, but they constitute a powerful intellectual movement. All these processes are a success for philosophy as I practice it. I can think of no 20th century philosophical current, apart from Marxism, that has had such a profound impact on society. I see that when I take part in discussions with high school students – they are fully engaged with these philosophical questions.

HAFNER: People talk about animal ethics while tucking into an Aberdeen Angus



“However, there is no single quality, such as rationality, that separates human beings decisively from animals.“

Markus Wild

“In several countries, great apes have been accorded rights of personhood. A court in Argentina ruled that keeping an orangutan in a zoo amounted to imprisonment.”

Markus Wild

steak. Animal rights have never been so intensively debated, yet more animals are being killed than ever before. Is our heightened concern for animals a form of compensatory behavior?

WILD: You need to distinguish between animal welfare and animal rights. Animal welfare can improve the conditions in which chickens are kept, for example, which is welcome. But animal welfare has also helped to stabilize the current system – it has not led to any fundamental change in behavior. Animal rights, by contrast, asks the question whether we should keep chickens or kill pigs at all in order to eat them. I see animal ethics not as a fig leaf but as a reaction to how we treat animals.

HAFNER: The biologist and philosopher Adolf Portmann, who worked at Basel University around the middle of the last century, is now a forgotten figure. Is he important in your work?

WILD: Very much so! Portmann tried to combine science and philosophy in a novel way. Unfortunately, his approach was not taken up much outside anthroposophy, which isn’t of much relevance to me, and anthropology. Traditionally, biology focuses on either individual or species survival, but he took a broader view. He was interested in what he called animals’ self-expression. He noticed that sea snails, for example, exhibit a rich variety of colors, even though they serve no evolutionary function in relation to other members of the same species or to their predators. In the darkness of the ocean, their colors cannot even be seen. From this, Portmann concluded that animals’ appearance constitutes an add-on, as it were, that is just as fundamental as individual survival – and that science must take into account.

HAFNER: What conclusion should we draw from the existence of this add-on?

WILD: That if we want to understand animals, we should not focus exclusively on individual and species survival. If we pay attention to the appearance and shape of animals, we may arrive at theories about their development that have not occurred to us previously. As long as science disregards this add-on, it cannot understand the whole animal. The approach can be extended to questions like animals’ sensitivity to pain – Portmann talked about their inner life. Many neurobiologists say that pain is subjective, we cannot get a handle on it scientifically and there is nothing we can say about it. With Portmann, we can respond by saying that neurobiology’s view of animals will remain limited if it fails to understand their inner life. Animals have complex forms of inner life. Recent studies indicate that the great apes express intentions when communicating. My team and I are working with behavioral scientists to look at how we might develop a concept of intentional communication by non-human beings.

HAFNER: So science could benefit from Portmann’s work?

WILD: It’s possible, yes. Portmann also presents a challenge to my approach, philosophical naturalism, as he calls into question whether living things can be explained in purely evolutionary terms. That is why I think it is important to make his works available in a digital multi-media edition. Portmann worked with pictures and did radio interviews. Incidentally, I would also like to edit the philosophical works of Ignaz Paul Vitalis Troxler, the first person to hold a chair of philosophy at Basel, who is regarded as the father of the Swiss federal constitution. Mind you, he was dismissed after only a year on suspicion of sympathies with the secessionists of Basel-Land. Portmann and Troxler represent a submerged tradition of philosophy in Basel. I would like to change that. ■

Markus Wild
is professor of theoretical philosophy at the University of Basel. His field includes animal philosophy – questions such as whether animals can think and how they feel pain. His *Introduction to Animal Philosophy* (published by Junius Press) is now in its third edition. Wild is a member of the Swiss Federal Ethics Committee on Non-Human Biotechnology.

A cafe, new buildings and a long night for the University of Basel.

First-hand

Children's University for clever kids.

What do Darwin's finches have to do with the colorful cichlids in Africa's great lakes, and why aren't dinosaurs truly extinct – many adults are often pretty baffled by these sorts of questions. Not so the some 900 girls and boys who have registered for this year's lectures at the Basel Children's University. In the large lecture hall in the Center for Teaching and Research, they will once again learn first-hand from real professors at the University of Basel – and discover that there will always be new questions to ask. The goal is to stimulate their curiosity and encourage them to think critically. After all: "Clever people are never satisfied with one answer," says Vice Rector Maarten Hoenen, on greeting the eight to 12-year-olds at the start of the semester. Basel Children's University is among the first of its kind in Switzerland and is a founding member of Eucunet (European Children's Universities Network). ■

www.kinderuni.unibas.ch

Next generation in the lecture hall
About 900 girls and boys attend lectures each year at the Children's University.

Caffè Bologna

New start under professional management.

It was a wonderful idea: a café designed and run by students of the University of Basel. A meeting point for young people, for locals; a place where you could drink and eat affordably – and where you could even sit with your laptop for a while without consuming anything. But sadly, the gastro world is a tough number, and soon after its launch in fall 2013, this great initiative was faced with harsh reality. Skuba, the innovators behind the Caffè Bologna project, no longer wanted to cover the costs of a loss-making business, although the daily takings had improved in the meantime with the support of gastro pro Roger Greiner as coach.

Since March 2015, Roger Greiner has been actively involved in Caffè Bologna without Skuba, and it is important to him to continue to run the meeting place entirely in the spirit of the original student initiative. With original ideas, he is bringing new life to the former Milchhüsli at Missionsstrasse 61: for example, companies can jointly finance meals on the menu so that students can eat more cheaply. A variety of synergies are currently being developed through collaboration with other providers. And with his attractive cultural and gastronomical program, Greiner is also making sure that Caffè Bologna is busy and bustling in the evenings, too. ■

Gastro pro Roger Greiner (wearing apron), new manager of Caffè Bologna, at one of his culinary events.

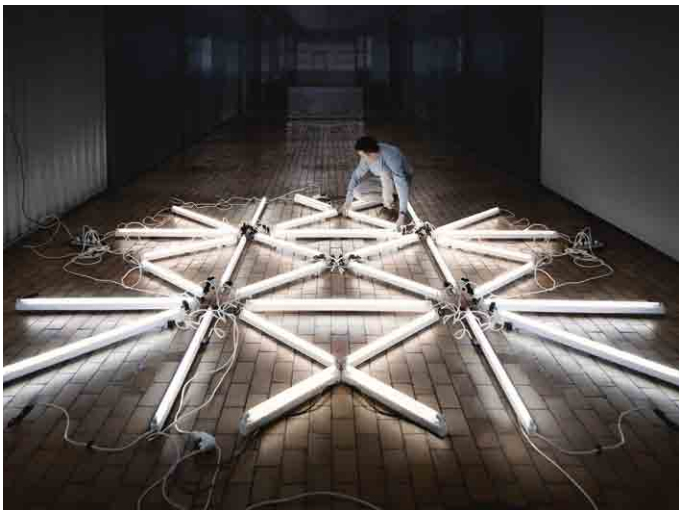
Dental medicine

Green light for a new center.

The people of Basel have spoken: At the start of March, a clear majority of 64% took a sovereign decision in favor of the merger of the public dental clinic, school dental clinic and the university clinics for dental medicine. The matter was still the topic of heated discussion in the Grand Assembly last fall and accepted with only a slim majority, whereupon the Basler Linke party launched a referendum. This means that the project, which is important for the University of Basel, can now be implemented.

Zurich-based architecture firm Birchmeier Uhlmann + Rabinovich Architekten AG won the competition to construct a new building for the planned University Center for Dental Medicine Basel and for the Department of Environmental Sciences at the University of Basel. The core of the new Rosental campus, the project will create a state-of-the-art infrastructure for patient care, research and teaching in dental medicine in Basel. It will develop an architectural solution that brings together in one place the public and university dental clinics, which are currently spread across three locations in the city. This merger will also benefit knowledge transfer from research to practice and to continuing education and professional development for dental practitioners. In addition to dental medicine, the University of Basel would like to concentrate the Department of Environmental Sciences – currently spread across various sites – on the Rosental campus in the coming years. ■

Rosental campus. The new University Center for Dental Medicine will be built on Mattenstrasse in the Rosental district of Kleinbasel. © Birchmeier Uhlmann + Rabinovich Architekten AG



Uni-Nacht
September 18, 2015, from 6pm, various locations. Free entry.

Uni-Nacht 2015

Long night of science

To mark its 555th anniversary, the University of Basel will be running another night of activities known as Uni-Nacht on September 18, 2015. The evening will focus on the university, science and researchers, and will be aimed at the general public of the Basel region. We expect about 10,000 visitors at the two large event sites, the natural sciences campus in the Biozentrum/Center for Pharmaceutical Sciences and the Kollegienhaus on Petersplatz. Other university institutions, such as the University Library and the Botanical Gardens will also be opening their doors.

The Uni-Nacht program includes tours, experiments, lectures, games, tests, discussions, presentations, films, theatre and dance performances, music and much more. The Uni-Nacht has something for all ages and aims to provide an insight into current research and teaching at the University of Basel. It will finish with a film evening and chill out in the inner courtyard of the Kollegienhaus as well as a big student party in the Gare du Nord. ■

www.uninacht.ch

Astragalus alpinus L.
Riffelberg ob Zermatt
pasture land ca. 2200 m
July 16, 1882

For a Future With a Future.

Photos: Cristina Moreno Gutierrez

Research in the spirit of sustainability.

Our generation is consuming energy and resources as if there were no tomorrow. To take just one example, the Swiss consume between 11 and 12 million tonnes of oil a year. Even though the reserves may have a few decades of life left, what will we do when they are exhausted?

Text: Thomas Pfluger

Our ecosystem relies heavily on the resources available to it for its stability. If those resources are used up more quickly than they can be replenished, the system itself will alter. In plain English, that means that not only our ecosystem but our economic and social systems will undergo fundamental and rapid change if we fail to act. Change is part of life, of course, but if it happens too quickly it can be dangerous. And we are heading in that direction fast. The WWF refers to the biggest loss of species globally since the disappearance of the dinosaurs, while climate researchers suggest that the world is warming at its fastest rate for 65 million years. We do not know what disasters will accompany these changes and how our society will react to them. A number of academics fear that the situation will become chaotic.

A better approach would be to deploy our resources carefully. The Leipzig forest manager Hans Carl von Carlowitz was the first, back in 1713, to use the concept of sustainability to capture this simple truth. In his treatise on the use of forests, he asked how wood could be conserved and cultivated in such a way as to permit its continual, lasting and sustainable use. However, it took another 250 years for sustainability research to really take off. Of key importance in this regard were two publications: the 1972 study The Limits to Growth, presented at the third St Gallen symposium; and Global 2000, a report commissioned by US President Jimmy Carter, which appeared in 1980. The modern concept of sustainability reached its definitive form in the 1980s. In 1987, the UN's Brundtland Commission defined a society as sustainable if it "meets the needs of the present without compromising the ability of future generations to meet their own needs".

But finding out how to achieve that is not easy. A great deal of knowledge is needed to ensure a just allocation of resources, both between people alive today and between the generations. That is where research comes in.

The University of Basel is committed to making sustainability and energy research a key priority. The botanist Ansgar Kahmen, for instance, is investigating how our flora is reacting to climate change (see page 19), while the economist Frank Krysiak is look-

Trifolium alpinum
Sassalba, Poschiavo
August 1886

Alopecurus agrestis L.
Alschwyl, Beerstenau
June 1827

ing to define exactly what sustainability is from an economic perspective (see the interview on pp. 24–26). Those working on sustainability issues also include sociologists and academics from many other fields.

Antonio Loprieno, Rector of Basel University, identifies two reasons for this commitment. "In the first place, since the accident at Schweizerhalle, there has been intensive research and teaching at the interface between man, society and the environment," he explains. "In this area, the University of Basel has led the way for Swiss higher education." Second, Basel is the only non-technical university in Switzerland to have been awarded a Swiss Competence Center for Energy Research (SCCER) – the Competence Center for Research in Energy, Society and Transition (CREST). This places the university among the leading institutions for sustainability and energy research in the social sciences and economics. "Having this as a key priority therefore makes sense not just for us, but for Switzerland as a research center," Loprieno says.

A new discipline

There are a number of ways in which sustainability research differs from other academic fields. Above all, it is not completely free to set its own goals. Society and politics play a vital role in deciding what is sustainable and what direction progress should take. For that reason, much sustainability research is practice-oriented and conscious of its wider responsibility to science.

Sustainability research is also unusual in that it covers the whole range of disciplines. Often it is reduced to environmental issues, but the University of Basel is particularly strong in economics, philosophy and the social sciences. For instance, some of its researchers are working on economic issues to do with the Swiss national grid (pp. 28–29). Others are looking at how to promote sustainable consumption (p. 27). The wide scope of sustainability issues also explains why, increasingly, they are being tackled in a collaborative way, across faculty boundaries.

Nonetheless, sustainability research continues to reflect the big differences between the various academic disciplines. Researchers such as philosopher Antonietta Di Giulio would therefore like to see greater acceptance of interdisciplinary work. At a recent conference at the University of Basel, the president of the Swiss Academy of Humanities and Social Sciences, Heinz Gutscher, even proposed the creation of a new discipline, with a "spirit of experiment", in sustainability research.

Under this scenario, interdisciplinary projects would cease to be the exception and become the rule. For this new way of thinking to succeed, new structures will also be needed to support research. The Swiss Competence Centers for Energy Research, which are part-funded and directed by central government, are already making an important contribution to integrated sustainability research. CREST, in particular, is organized on interdisciplinary lines. It is surely no accident that its management has been entrusted to the University of Basel, which has a long tradition of collaboration and diversity. ■

Photo: Präsenz Schweiz, EDA

May 22, 2015

University of Basel at Expo Milano.

With the slogan 'For a Future with a Future – Research in the Spirit of Sustainability' («Für eine Zukunft mit Zukunft – Forschen im Dienste der Nachhaltigkeit.») the University of Basel will be represented at Expo Milano 2015. The world exhibition is clearly characterized by sustainability: With its focus on 'Feeding the Planet – Energy for Life', it will provide a platform for a broad debate on the future of the planet. In 'Strategy 2014', the University of Basel defined the subject of sustainability and energy research as a focal area. Expo Milano 2015 offers an ideal opportunity to present the current state of research to an international audience.

'For a Future with a Future – Research in the Spirit of Sustainability', May 22, 2015, Swiss Pavilion, Milan.

Astragalus alpinus L.
Lenzerheide, Valbella
on meadowland 1480–1500 m
July 1920

Plant life is already reacting to climate change.

Text: Thomas Pfluger

Ansgar Kahmen has been Professor of Sustainable Land Use in the Department of Botany at the the University of Basel since 2013. He is also an associate professor at ETH Zürich. His research focuses on the reaction of vegetation to global climate changes. Born and raised in Austria, the botanist has worked as a researcher in Germany, the US and Australia.

What will the Swiss countryside look like in 50 years' time? With climate change, the growing conditions for plants are also changing. Ansgar Kahmen, Professor of Sustainable Land Use in the Department of Botany at the at the University of Basel, is looking at how plant life is reacting to these changes.

The pasture land grazed by Switzerland's cows is one focus of Kahmen and his team's research. For a long time, scientists have suspected that areas of high biodiversity are better equipped to deal with extreme changes in weather. By measuring the yields from pastures with different compositions, the Basel researchers were able to provide conclusive support for this hypothesis. As a result of their findings, a wider variety of seed types will now be used for pasture land to ensure that our dairy cows have enough to eat even during relatively dry spells.

Kahmen also found important signs that environmental changes over the last 100 years have already started to affect our flora. "We have the first indications that plants today behave differently from those 150 years ago," Kahmen says. "The effects of global change are not a vision of the future – we are experiencing them right now." He was able to look back into the past thanks to historical plant collections like those of the Department of Botany and the Basel Botanical Society. These herbaria, which record the history of plants over more than 300 years, are not only beautiful – they are also an extremely important resource for modern research.

According to Kahmen, plants do far more than keep our countryside looking pretty or sustain the agricultural industry. "They prevent the soil being washed away, keep atmospheric humidity in balance and provide us with clean drinking water." They even help to slow down climate change, as they lock up a quarter of surplus carbon dioxide globally. If we want to know the future, we cannot afford to disregard what is happening to our plant life. ■

Campanula Scheuchzeri L.
Between Mauvoisin and the bottom of the valley of Bagnes, Valais
July 28, 1880

Not all that is green is sustainable.

Text: Oliver Klaffke

In the Department of Social Sciences at the University of Basel, Paul Burger conducts research into sustainable behavior. He examines its consequences, how to encourage it, and the reasons why people choose to live by sustainable principles.

"Whether someone uses LED lights in their home or reduces the amount of water used to flush their toilet has little relevance to sustainability as a whole," says Professor Paul Burger, head of the sustainability research group in the Department of Social Sciences at the University of Basel. According to Burger, decisions that trigger further changes have much more impact. Sustainable decisions "pull strings" – and these are what interest him.

For example, someone who chooses not to have their own car not only helps to cut down on fossil fuels, but also reduces the amount of space they need. This decision can also contribute to a reduction in traffic on the roads, which in turn leads to a lower accident rate. A person without a car is also more likely to shop in their local area rather than at a shopping center outside the city, helping to keep the city center alive.

Taking stock

In theory at least. The actual consequences of foregoing a personal car is one of the questions raised in the research program run by Burger's group. "At first glance, this is a good thing from a sustainability perspective," says the sociologist. "But we don't really know what impact the decision will ultimately have on sustainability." The money a person saves by not buying a car could easily be used for overseas vacations. The reduction in their carbon footprint would then disappear in the aircraft's contrails. Scientists refer to this as the "rebound effect", when good intentions to increase efficiency end up achieving exactly the opposite. "This would not be in the interests of sustainability," says Burger.

The question of how to encourage sustainable behavior is another focal point for the researchers in Basel. As part of the Swiss Competence Center for Research SCCER-CREST, which looks at socio-economic issues connected to the energy transition, they are examining the conditions under which people opt for sustainable energy solutions. The aim is to assess the likelihood that measures to encourage citizens to curb their energy consumption will be successful. What is the effect of education campaigns? How successful are attempts to influence the values and attitudes of individuals? How do people respond to different pricing models? Which reduces energy consumption: intelligent electricity grids or an initiative such as that for 2000-watt households? "We hypothesize, among other things, that program design and social learning processes play an important role," says Burger with conviction. With this knowledge of how to initiate changes in behavior, his team hopes to help politicians, authorities and NGOs to better achieve sustainability targets and formulate the right arguments.

Not always that easy

The road to sustainability is not always clear, as an example from India demonstrates. In the last few years, programs have been launched in rural areas to build toilets in order to improve hygiene and therefore the health of the people. However, an investigation has shown that the population pays less attention to the health benefits. "The people in these areas view the time gained as very important," says Burger. They no longer need to walk long distances to go to the toilet, and the secure space also makes the women safer. At the same time, the people develop greater self-esteem. Without accompanying research, the actually perceived benefits of improved sanitary facilities would have remained unknown. "This sort of knowledge allows future campaigns to be better planned and increases their chances of success," says Burger. ■

Paul Burger
Following a degree in philosophy and history, Paul Burger completed his 'Habilitation' in 1997 at the University of Basel. Since 2006, he has been head of the sustainability research group at the Faculty of Humanities. Burger's research focuses on theoretical and empirical aspects of sustainability.

Fungi, plastics and sustainability.

Bioplastics made from wood, a renewable raw material, are a sustainable alternative to plastics derived from petroleum.

Text: Oliver Klaffke

Researchers at the University of Basel are investigating how fungi and bacteria decompose wood. This basic research is facilitating the production of new materials – and might also provide clues about processes that maintain human health.

Florian Seebeck has been Professor of Molecular Bionics at the University of Basel's Department of Chemistry since 2011. He investigates the potential of bacterial enzymes for biotechnological use. Seebeck has researched at ETH Zürich, and in Germany and the US.

At some point during the Carboniferous Period, nature suddenly found itself facing a garbage problem of mammoth proportions. Trees grew very tall and, when they died, left behind a huge amount of wood that could not be broken down by the organisms that were alive at the time. The blame lay with lignin, a chaotic mixture of structurally similar molecules that stabilizes wood by filling in the gaps in its cellulose scaffold. "It took quite a while for mechanisms to develop that could break down lignin," says Florian Seebeck, a professor of chemistry at the University of Basel.

Seebeck's work involves looking at how fungi break down lignin. He is especially interested in finding out how fungi survive the decomposition process unscathed, as the slow shredding of the molecular chains produces chemical reactions that are aggressive to all forms of life. "The fungi are under oxidative stress during the splitting," says Seebeck. This stress occurs when free radicals (molecules with a strong tendency to bind to other substances) are released, attach themselves to the tissue of the fungus and damage it.

A source of new biomaterials

Lignin is being discussed as an alternative to oil. It could, for instance, replace oil in the manufacture of plastics and thereby play a key role in the wood technology of the future. For that to happen, however, lignin has to be broken down into small molecular units. This means that everything scientists can find out about the chemistry and biological decomposition of lignin will help bring us closer to a sustainable industrial use of wood.

"Fungi and bacteria have developed a form of protection that allows them to survive the oxidative stress," says Seebeck. The key is a molecule known as ergothioneine, which puts free radicals out of commission. Last year, Seebeck and his team worked out how ergothioneine is synthesized. The literature contained findings on a precursor of the substance, but the mechanism that turned the precursor into a functional molecule was unclear. "We found an enzyme that synthesizes it," says Seebeck, who gave the enzyme the prosaic name EgtB.

Ergothioneine does not just occur naturally in bacteria and fungi; the protective substance has been found in almost every organism. "Its presence in humans was established over 100 years ago, but no one has paid it much attention," says Seebeck. The reason for this is simple: no diseases are caused by a deficiency of ergothioneine. It seems that the body always has sufficient supplies because it does not break down much, in contrast to vitamin C, for instance, which quickly degrades and a deficiency will lead to scurvy.

"This is why people quickly recognized that vitamin C was important for human health," explains Seebeck, "and why they overlooked ergothioneine." Yet the role that it plays in the human body could be as important as the one it plays in the bacteria and fungi that break down lignin. "Oxidative stress occurs everywhere in nature," says Seebeck. It would not be surprising if the successful molecule also had an antioxidant effect in humans. ■

Primula veris L. em. Huds.
Between Forch and Greifensee
Canton Zürich
May 5, 1918

“We are all agreed that we need sustainability. However, we are not agreed on what this means.”

Frank Krysiak

“Some fundamental uncertainties remain”.

UNI NOVA spoke to Frank Krysiak about sustainability research and its importance to Swiss politics.

Interview: Matthias Geering and Thomas Pfluger Photo: Christian Flierl

Professor of Environmental Economics, Frank Krysiak leads the Competence Center for Research in Energy, Society and Transition (CREST) run by the University of Basel and Zurich University of Applied Sciences. He would like to see high-quality research making a contribution to society.

UNI NOVA: Professor Krysiak, we are moving toward a more sustainable society. Is there really still a need for research, or would action not be more appropriate?
FRANK KRYSIAK: We are all agreed that we need sustainability. However, we are not agreed on what this means. Research can help us to understand what form sustainable development should take in Switzerland in the next 20 years.
UNI NOVA: What type of research do we need here?
KRYSIAK: At the University of Basel, I see our role as one of basic research because there are still some fundamental uncertainties in many aspects. One of my topics is dealing with uncertainties, weighing up opportunities and risks. Take the energy transition. We are investing in renewable energies and energy efficiency. How do we assess whether this is sustainable? If the probability is sufficiently great that people will look back in a few decades’ time and regard the energy transition as a good thing, then it can be considered sustainable. Sustainability is an extraordinarily complex issue. The more we research, the more questions we have.
UNI NOVA: Can you explain this complexity?
KRYSIAK: Basically, the idea is to guarantee the well-being of future generations of humans. To do so, we want, for example, to move to renewable energies, reduce CO_2 emissions, preserve biodiversity and protect plant and wildlife. We can try to solve all these problems to an equal degree, but this would be enormously costly. Therefore, we look at how we can weigh up the various objectives against one another. Perhaps it is permissible to let one or two species die out if this enables us to achieve something else that is sufficiently positive. Today, many researchers work on the assumption that sustainability objectives can be weighed against each other – within certain boundaries. Once we have set ourselves targets of this type, we can decide what instruments we need to achieve them.
UNI NOVA: What form can these instruments take?
KRYSIAK: One approach we are currently investigating is a scorecard. This would measure the various activities of a company with regard to sustainability. The company would have to achieve a certain overall sustainability value, but would not have to perform well in every single aspect. For example, more emissions of a particular pollutant would be permitted if its performance in another area were deemed positive.
UNI NOVA: Who determines how this scorecard would be structured, what sustainability would involve – science or politics? Is there a conflict here?
KRYSIAK: The situation tends to be as follows: Scientists approach society with various offerings. Society then has to say what it wants. A few years ago, Swiss politicians opted for what is known as ‘Weak sustainability plus’. This prescribes a certain degree of flexibility when implementing sustainability measures, but adheres to minimum standards in all areas.
UNI NOVA: But public opinion can be highly volatile. After the nuclear disaster in Fukushima, it was thought that nothing would be the same again. But already, discussion of the matter has all but ceased.
KRYSIAK: I see things a little differently. Following long-term developments, Fukushima provided the final impetus, as it were, to begin the withdrawal

“Perhaps it is permissible to let one or two species die out if it helps us achieve another sustainability goal?”

Frank Krysiak

from nuclear energy. Even before Fukushima, it would have been difficult to find anyone willing to invest billions in a new nuclear power plant.

UNI NOVA: The political expectation is that your research will deliver findings that can be implemented directly. Are you under a lot of pressure?

KRYSIAK: There is definitely a real pressure to produce quick results. The political processes leading to the energy transition are underway, and a scientific basis is required to make decisions. This is one of the aims of CREST – providing quality-assured answers to social questions.

UNI NOVA: How do you deal with these expectations?

KRYSIAK: We work with a mix of simpler and riskier projects. Some are certain to provide clear findings, such as a project to redesign the approval processes for solar, wind and geothermal technology. Other investigations involve a high risk because nobody has proceeded in this way before. For example, we ask what form a robust energy policy would take, a policy that continues to work even if external circumstances change – for example, if the EU takes a completely different path than currently envisaged. Naturally, we hope that something will come out of this, but we cannot guarantee it.

UNI NOVA: So these questions originate from politics or society?

KRYSIAK: Usually. But it can also work the other way around – sometimes, research findings trigger political processes. For example, we – and other researchers – have suggested introducing differentiated taxation for electricity instead of a cost-covering feed-in rate. Electricity from renewable sources would then be taxed at a lower rate or not at all. The aim here is to prevent coal-fired electricity from being imported when Switzerland’s nuclear plants are powered down. This would create an incentive to use renewable energy.

UNI NOVA: The current management system for energy is complex. The government, cantons and municipalities all get involved with their own instruments aimed at reducing energy consumption and promoting renewable energy. Are you trying to find simpler solutions for the whole of Switzerland?

KRYSIAK: We are looking for solutions that can be launched in parallel to the current instruments. They should gradually begin to take effect and replace the old instruments. But first, we need to be certain that the new instruments work. And for this we need a period of transition and research. This development will end with an ecological tax reform. But that will take a few more decades.

UNI NOVA: Environmental economics and energy research undoubtedly make a key contribution to sustainability research. What role do other academic disciplines play?

KRYSIAK: Many subject areas make important contributions: for example, law and sociology. Naturally, the natural sciences play a core role too. Without their results, we would not be able to define the objectives of sustainable development. However, it strikes me that natural scientists can sometimes lose sight of the bigger picture. A few years ago, I was invited to a biodiversity conference. Every speaker presented one species of animal that was particularly worthy of protection. As an economist, I said that we can protect all these creatures, but at the cost of a few million human lives. Money used for this purpose cannot be used for other things. Sometimes we need to go without! For me, weighing up what we really want to do in aid of sustainability and what we have to relinquish is central.

UNI NOVA: So the natural sciences need to keep the bigger picture in mind.

KRYSIAK: We need to come closer together. The natural scientists need a better overview. On the other hand, economists and social scientists need to refrain from researching only at a meta level. Rather than spending another 50 years on a precise definition of sustainability, we should start taking specific action. ■

The spirit is willing, but the urge to consume is stronger.

"Promoting sustainability is not about preaching self-denial."

Text:
Oliver Klaffke

Antonietta Di Giulio completed a doctorate in philosophy at the University of Bern, where she later taught and researched for many years at an interdisciplinary institute (IKAÖ). She is currently a researcher at the University of Basel's Department of Environmental Sciences for the Man-Society-Environment (MSE) program. She deals with inter/transdisciplinarity and sustainable consumption.

For Antonietta Di Giulio from Basel University's Man-Society-Environment (MSE) program, "promoting sustainability is not about preaching self-denial. The key question is, what needs must a person meet to enable them to lead a good life?" The goal of the sustainability movement is to make it possible for everyone to have a good life. Di Giulio is convinced that having money or a certain standard of living is not enough to guarantee that. "When we try to pinpoint the criteria that make for a fulfilling life, we find that other values take priority: engaging in social interaction, having a satisfying job that pays a living wage and being able to control your own destiny."

At MSE, Di Giulio and her group are working on three topics important for sustainability in everyday life: sustainable consumption, inter/transdisciplinarity, and education for sustainable development. The focus of the work is on identifying ways of promoting sustainable behavior.

Participatory methods

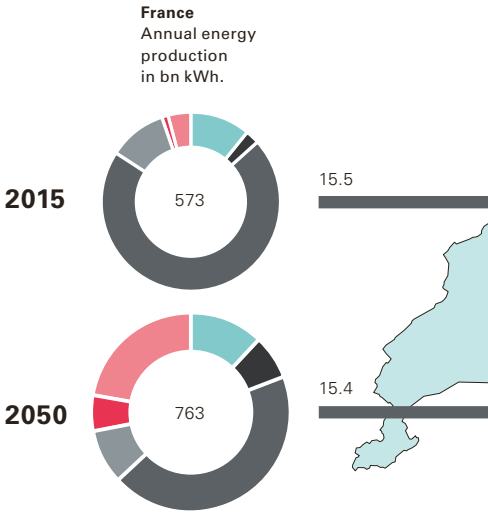
To find them, the group has long since abandoned the famous ivory tower of academia. Instead of relying solely on deductive reflection or empirical investigation for answers, they have developed an approach based on dialog with people. "We often use participatory methods," Di Giulio says. "Members of the public are involved in our projects." Their transdisciplinary approach takes interdisciplinarity a step further. To gain a broader view of sustainability, they draw not only on contributions from different disciplines but on the widest possible range of perspectives, including from society more generally. This reflects their conviction that academia cannot work in isolation. "Where, for example, do we set the limits on consumers' personal freedom, to prevent them from harming others or the environment? That is not a simple question for academics to answer," Di Giulio says. To ensure that their conclusions have broad-based support, the group seeks to initiate debates. This is the approach being followed by a Swiss National Science Foundation project for National Research Program (NRP) 71, in which Di Giulio, along with biologist Patricia Holm and other researchers, is looking at energy policy measures. They want to find out how people see such measures as impacting on their lives and what influence this has on acceptance levels.

Both individuals and manufacturers have a role

"We want to act as a stimulus, to ensure that the political goals can gain support within society and be realized," Di Giulio says. But because achieving sustainability is not dependent on individual behavior alone, the Basel research team is looking at the whole system. For example, sustainability can be promoted by setting limits on consumption, but this is not so much about changing the purchasing habits of every individual; often it is much more effective to start with the manufacturer. Thus in recent years there has been growing debate about the issue of planned obsolescence – the fact that appliances have been shown to have a lifespan built into them by their producers. This explains why, for example, printers give up the ghost after printing a certain number of pages. "By banning built-in wear and tear or having extended warranty periods, we can force industry to offer products that don't need to be replaced as often," Di Giulio says. Without such measures, we are unlikely to achieve sustainable consumption across the board. ■

Swiss electricity flows before and after energy transition.

Text: Thomas Pfluger



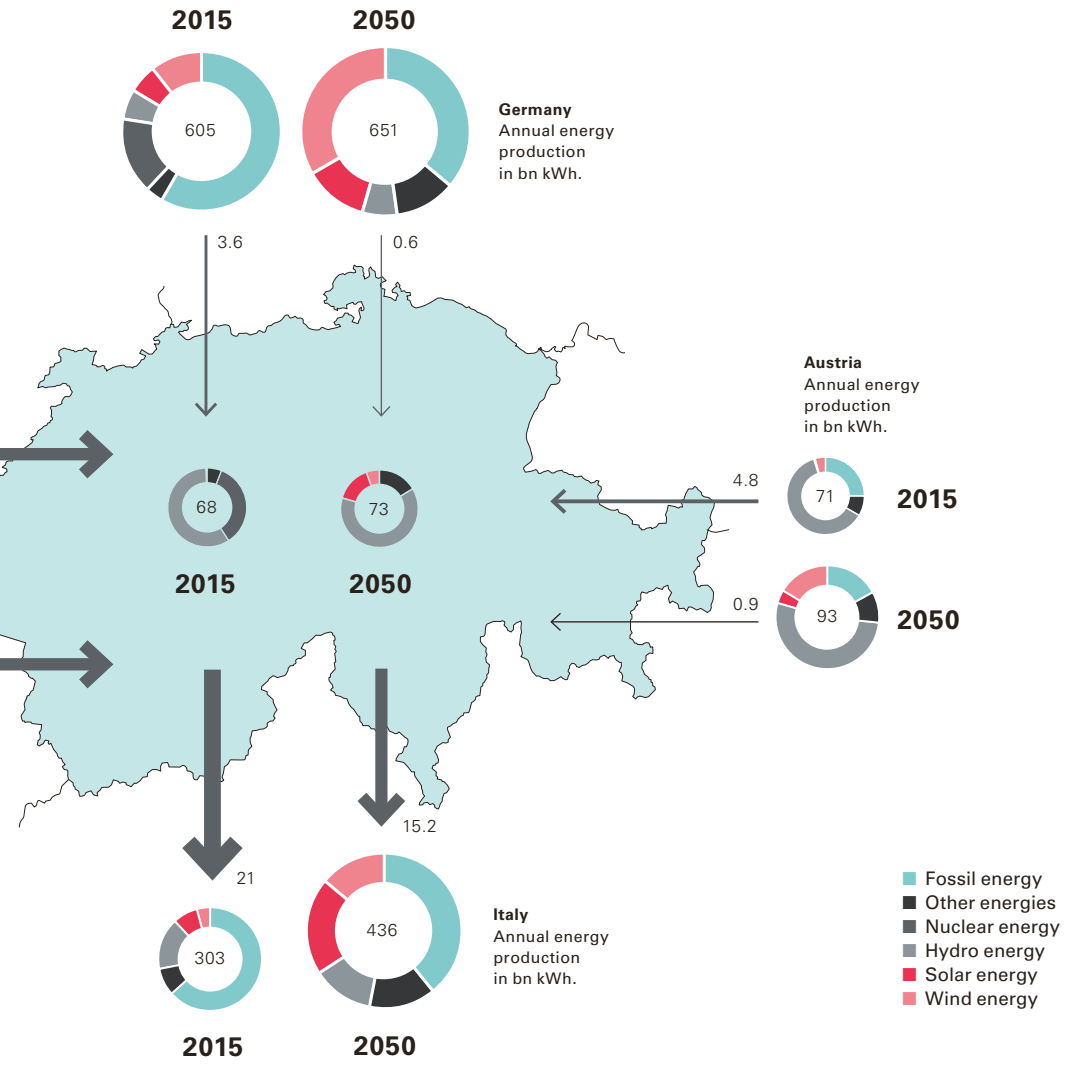
Electricity flows in 2015 and 2050
Switzerland is a transit country in terms of European electricity supply. Currently, electricity from nuclear or hydro power is mostly transferred from northern Europe to the south. By 2050, the proportion of electricity from renewable sources is set to increase strongly (hydro power, solar energy, biomass). According to the research findings of Weigt's team, the overall electricity flows will, in fact, change only slightly. However, the day and night rhythm will alter radically: during the day, there will be many peaks in the electricity flow because solar electricity will become much more significant (see graphs on daily use).

Modeling the future.

Professor Hannes Weigt uses a computer model that he has developed to research into the Swiss electricity network at the University of Basel's Faculty of Business and Economics (WWZ). "We can picture the Swiss electricity system as a road network," explains the industrial engineer. "Our model shows the highways within this network." The Basel researcher simulates in rich detail the ways in which energy supply in the next few decades will change under particular conditions.

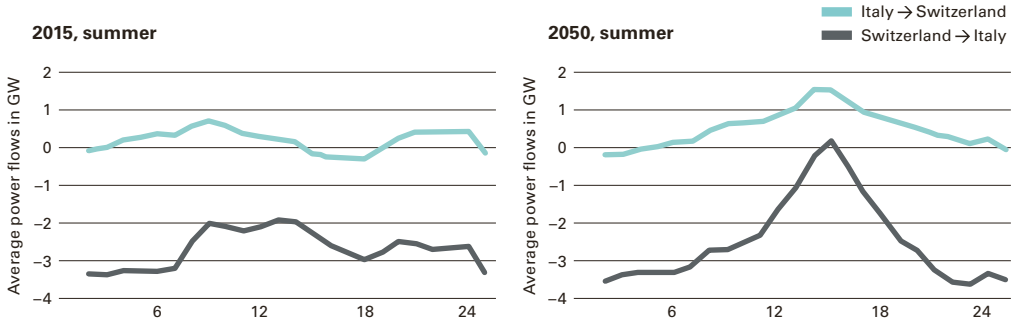
At the core of his research lies the transition to sustainable electricity sources. He examines, among other issues, shortages in the supply that regularly lead to network overloads and that could at least potentially hinder the international electricity flow. Together with his team, he investigates how and when these shortages can best be overcome. This is important to enable an increase in the proportion of electricity from renewable sources. ■

Hannes Weigt is Professor of Energy Economics at the Faculty of Business and Economics, University of Basel. Educated in Dresden, the industrial engineer now heads the interdisciplinary research center for sustainable energy and water supply (FoNEW).



Changing daily use

European electricity flows in 2050 will be driven strongly by solar electricity. Compared with 2015, the daily peaks will therefore increase dramatically.



Energy transition Renewable sources

Wind power
Electricity from wind power is growing in importance. Much of this will be produced in northern Europe.

Solar energy
The increase in the production of solar electricity is particularly strong, particularly in Italy, France and Switzerland.

Hydro power
The potential of hydro power will have been exploited to a large extent by 2015 and electricity production from water will not increase much up to 2050.

Other sources (e.g. biomass)
Electricity from biomass and other minor sources will to a limited extent become more important up to 2050.

Energy transition Conventional sources

Nuclear power
By 2050, nuclear power will be produced only in France – Germany and Switzerland have discontinued this energy source.

Fossil energy (coal, oil, gas)
The importance of electricity from fossil fuels will reduce everywhere up to 2050, particularly in Germany.

Assistant professor

Public opinion and climate change.

Aya Kachi
is to become an assistant professor at the University of Basel's Faculty of Business and Economics.

Since climate change does not stop at borders, international political measures are needed to combat it effectively. While this conclusion is inevitable, it raises questions about democratic legitimacy: who decides climate policies and who is affected by the consequences? Relevant decisions tend to be made by countries with economic clout, while their impact is felt especially by poorer nations.

Economist Aya Kachi examines how the economic repercussions of climate policies impact people's lives. To this end, she uses statistical methods that she has developed herself, in particular for survival analysis (which examines the amount of time until a specific event) and spatial econometrics (which is concerned with geographic differentials). As part of her doctoral research, she also investigated key factors in the creation and demise of democratic systems.

The 36-year-old Japanese national has now been appointed assistant professor at the Competence Center for Research in Energy, Society and Transition (CREST). Run from Basel and co-funded by the Swiss government, CREST is developing a scientific basis for Switzerland's future energy strategy. Aya Kachi studied economics at the University of Tokyo and Duke University before obtaining her doctorate from the University of Illinois. Most recently, she was a postdoctoral researcher at ETH Zurich, working with Professor Thomas Bernauer. She has received several international accolades for her research. ■

Master's degree

MSD graduates number 170.

Research into sustainability requires academics from a wide range of disciplines to work closely together. One way in which the University of Basel helps to encourage interdisciplinarity is its specialized Master's degree program in Sustainable Development (MSD). This program is unique within the German-speaking region, as nowhere else offers a course at this level dedicated solely to sustainability. Students are taught how to combine knowledge from several fields and examine questions of sustainability from different perspectives. For example, one Master's thesis focused on the microplastics contaminating the Rhine while considering various aspects.

By the summer, 170 students will have completed the MSD. Today, graduates of the program work for consultancy firms and authorities, in company sustainability departments and at the University of Basel – for example, Denise Bienz Septinus, manager of the Sustainability Office. Other alumni are working toward their doctorates around the world and are contributing to a more sustainable society through their research. ■

www.msd.unibas.ch

Sustainability Office

Inspiration and funding programs.

Following an initiative by students and staff in the Department of Social Sciences, the Sustainability Office was set up in January 2012 by the Rectorate at the University of Basel.

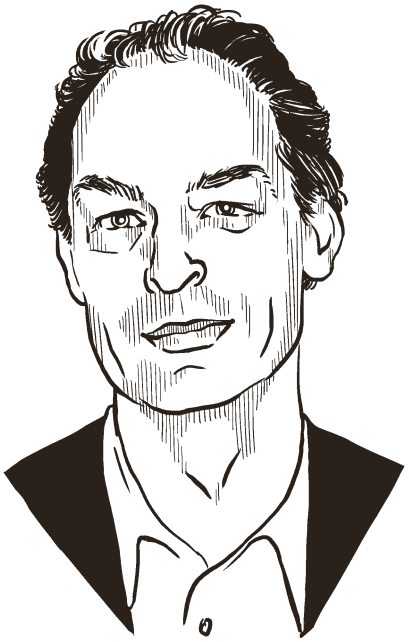
Together with her team, manager Denise Bienz Septinus – who herself graduated from the Master's degree program in Sustainable Development – provides food for thought such as the 'Boost' funding program, which rewards student ideas on sustainability. For example, March 2015 saw the first ever recycling party take place, in which entry was free to anyone bringing a used electrical device. Everything collected was disposed of in an environmentally friendly manner by a non-profit recycling company.

The office also looks at sustainable catering for the student cafeteria and is involved in a pilot project for operational sustainability management in the Department of Physics. In 2013, the team published guidelines for sustainable event organization that will be used for this year's Uni-Nacht. More information about the office can be found at www.unibas.ch in the section on the Vice Rectorate for Teaching and Development. ■

In montibus prope Locles
Jura
June 1836

When is a person dead?

Illustration:
Studio Nippoldt



“We can better understand what life and death mean if we do not view the brain as the central organ of a human being.”

Andreas Brenner

From its beginnings, with the spectacular heart transplant performed by Christiaan Barnard in Cape Town in December 1967, modern transplantation medicine has been confronted by questions that ultimately call into question the legitimacy of this field of medicine. This was already the case shortly after the operation in Cape Town, when a similar heart transplant operation was being planned in Harvard. The thought-provoking question posed by the American doctors was whether it is permissible to remove the heart from a living human being. The answer was of course not, and so the ethics commission at Cambridge University came up with a new criterion for death, namely brain death. From the point of view of transplantation medicine, this criterion had the obvious advantage that the person whose organ one wished to use for the purpose of transplantation was already dead although their organs were still alive and fresh. It is this bringing forward of the moment of death that has been a constant subject of debate, even up to the present day.

Critics see in this a reduction of a person to their brain alone, and they dispute that a person can be appropriately understood in terms of the performance level of their brain. Such misgivings have, as mentioned, existed since the very beginning of transplantation medicine. Just a year after the Harvard case, Hans Jonas criticized a number of inconsistencies in the new definition of death. In his rather defiantly titled essay *Against the Stream*, the later world renowned author of *The Imperative of Responsibility* could not help but make a connection between the new definition of death and the desire for those operations, which without this new definition would not be legal. Does desire, here, stand in the way of deeper insight?

For, and this is Jonas’ further objection, if a person’s body counts for nothing while their brain counts for everything, and if after the supposed irreversible failure of the brain a person is judged to be dead, then the existence of non-cerebral perceptions and capabilities is denied. This increasingly presents medicine with questions that it struggles

Andreas Brenner
is titular professor of philosophy at the University of Basel. Among other works, he has published: «Leben» (2009) and «Bioethik und Biophänomen. Den Leib zur Sprache bringen» (2006).

to answer. How is one to understand, for example, a pregnancy guided through to successful childbirth although the mother is 'dead', namely a brain-dead person? Why are such people who have been identified as organ donors for transplantations still referred to as patients and not simply referred to as cadavers? In order to avoid such inconsistencies, the brain death criterion should best be described as what it is, a definition, and not as what it is not, namely an appropriate description of the phenomenon of being alive.

In relation to this, early in the discussion of the issue, neurophysiologist Detlef B. Linke observed: "No one who is diagnosed as brain dead should ever fear that they are not brain dead. Whether they are also dead when they are brain dead, that is another question." And this other question cannot be resolved by simply drawing a final line under the debate, a debate that has raged for more than half a century. Medical and philosophical research, the latter mostly from the field of body phenomenology, makes it clear that we can better understand what life and death mean if we do not view the brain as a human being's central organ. We make progress if, like Thomas Fuchs, the holder of the Karl Jaspers professorship in Heidelberg, we view the brain as a mediating organ. This understanding of the brain places this organ in the concert generated by the corporeality of human beings. This concert is painfully and probably irreversibly impaired when an important organ fails, but it does not necessarily therefore cease to exist entirely.

Taking this view, the pregnancy of the brain-dead woman is not a medical miracle, and the impression, again and again reported as disquieting by staff from the fields of medical therapy and by families, that a person who has been declared dead still seems somehow to be alive, can also now be explained.

All these concerns are in the meantime taken into full account by renowned supporters of transplantation medicine. The US medical ethicist Robert Truog also doubts that a person who is brain dead is also dead. This is not, in his opinion, an argument against organ transplantation, and in relation to this, he speaks of 'justified killing'.

If such moral and intellectual contortions are to be avoided, then there is only one solution: the transplantation of singularly vital organs must cease. ■

Stephan Marsch
is Clinical Professor of Intensive Care at the University of Basel and head of the Intensive Care Unit at University Hospital Basel.

In biological terms, death is not a singular event but a process. After a cardiac arrest, the entire brain dies within a few minutes, whereas other types of tissue are more resistant to oxygen deprivation and can therefore stay alive for much longer. The cornea, for example, can be removed from the deceased up to 72 hours after death and successfully transplanted. Certain cells and tissue can even be removed up to a week after death and successfully propagated in cell culture.

Due to the social implications, an unambiguous determination of death is essential. In earlier times, this was relatively easy: a dead body was stiff, cold and pale. Once this state had been reached, it was empirically certain that it could not be reversed. As mentioned, tissue can be transplanted or propagated in cell culture after a death determined in this way. It can therefore be said that the archaic definition of death implicitly includes two main aspects that have been adopted by more modern definitions: 1) Death is defined as the point in the dying process at which it becomes empirically impossible

“Basing death on the failure of the brain as the central organ appears equally unfounded as the historical approach of basing it on cardiac death, with the heart as the central organ.”

Stephan Marsch

for the individual to be revived, and 2) after the death of the individual, certain body tissues can be kept alive with the help of technology.

The invention of the stethoscope in the 18th century made it possible to diagnose cardiac death based on a lack of heart activity. Cardiac death was empirically proven to be irreversible, which allowed an early and reliable diagnosis of death. As a result, the heart was seen as the most vital organ and was even said to house the soul. This hypothesis was questioned with the first successful heart transplant.

Brain death is defined as the complete and irreversible cessation of activity of the brain and brain stem. When the brain stem fails, the respiratory center within it also shuts down permanently, making independent breathing impossible. In this state, the body's oxygen supply and organ functions can be maintained only temporarily with the aid of a respirator. If the respirator is switched off or malfunctions, this inevitably leads to cardiac death due to oxygen deficiency. Thus, it became possible to study brain death only when the first respirators were invented in the mid-20th century. This new phenomenon created the need for medical and legal clarification in intensive care and transplantation medicine, which resulted in today's currently valid neurological definition of death.

Like its historical predecessor, brain death fulfills the criteria of empirically determined irreversibility. On the time axis of the dying process, it is possible to diagnose death slightly earlier among the small number of patients concerned than in cardiac death. No biological justification exists for determining the importance of an organ based on the order in which its failure causes the irreversible death of the entire organism. Basing death on the failure of the brain as the central organ therefore appears equally unfounded as the historical approach of basing it on cardiac death, with the heart as the central organ.

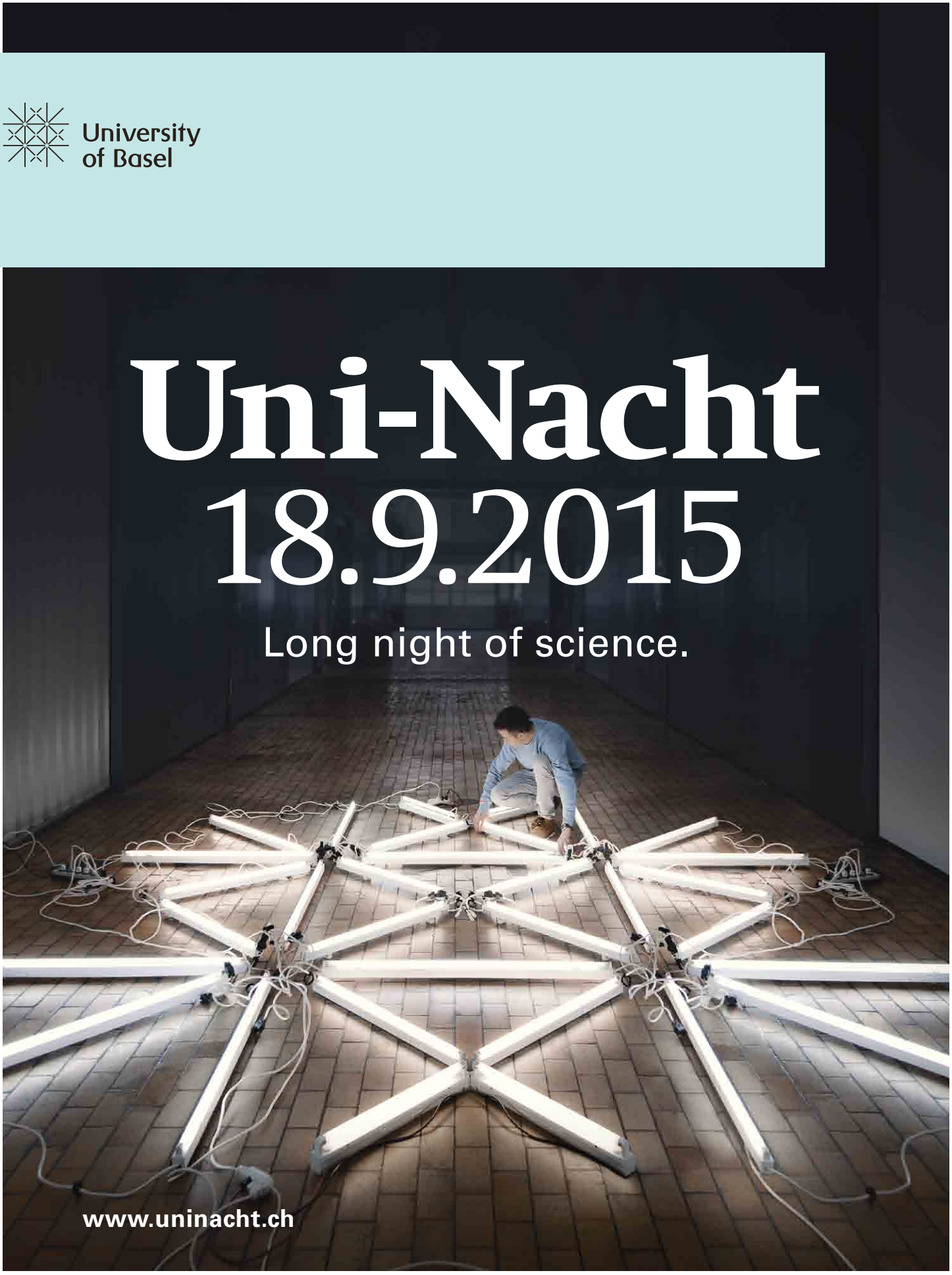
In comparison with other definitions of death, the emotional experience is absent in brain death: brain dead patients are warm, look 'alive', and special expertise is needed to distinguish reliably between life and death. It is without doubt legitimate to reject transplantation medicine. The obvious usefulness of the concept of brain death for transplantation medicine offers its opponents a comfortable argument without having to position themselves as opponents. Therefore, it can be hypothesized that if brain death were diagnosed not for transplantation reasons but merely to put an end to futile intensive care, the concept would not even be acknowledged outside the area of intensive care.

Brain death differs from previous definitions of death only in quantitative (time, number of transplantable organs) rather than qualitative terms. Brain death is established as a criterion of death in the western world and in many countries, such as Switzerland, is firmly anchored in democratically legitimized laws. The concept has been reviewed repeatedly by broad-based international committees, the majority of which have found it to be valid. As no new evidence has been found in recent years, there is no need to change the current practice at present. ■

University of Basel

Uni-Nacht
18.9.2015

Long night of science.



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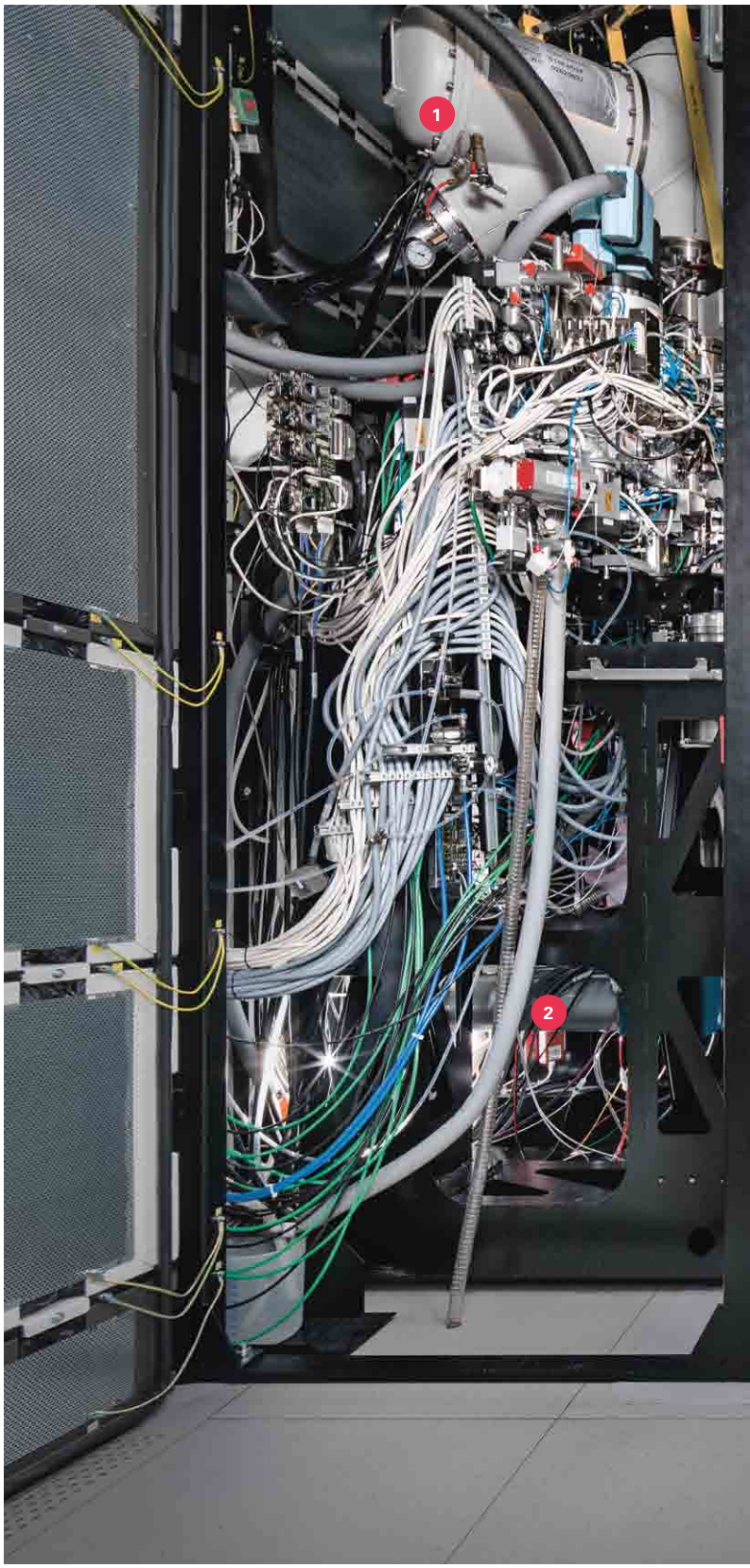
Tracing the molecules of life using electron microscopy.

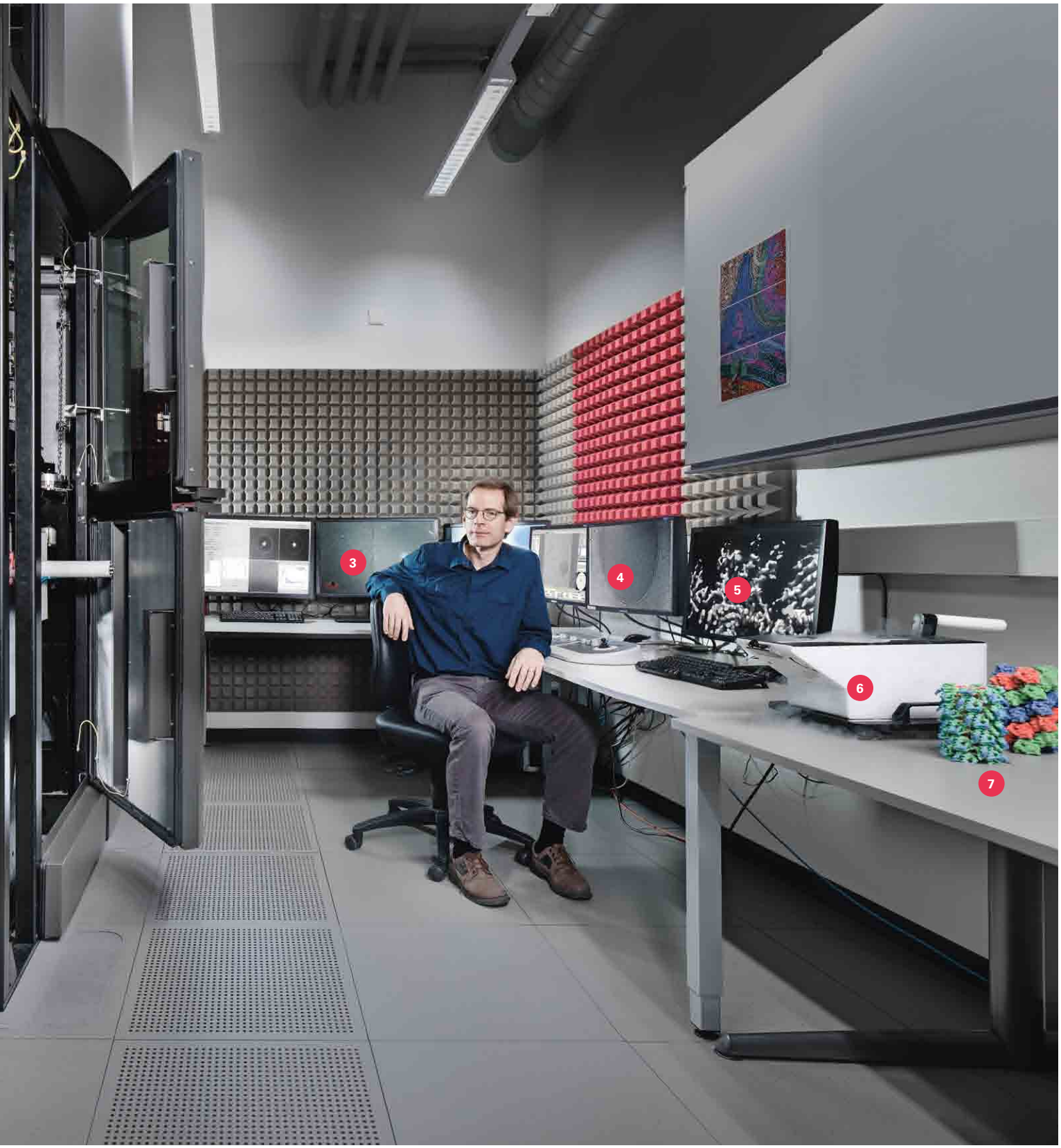
Photo: Basile Bornand



Henning Stahlberg

Henning Stahlberg and his colleagues from the Center for Cellular Imaging and NanoAnalytics (C-CINA) at the Biozentrum are studying the mechanisms of life at an atomic level of detail with the help of Titan, one of the world's most powerful electron microscopes. Titan and other specialist electron microscopes at C-CINA provide unique insights into the 3D structures of tissue, cells, and individual molecules – down to the atoms.

1 'Titan' is the largest of several electron microscopes at C-CINA. At 4.5 meters in height, it records the sharpest images of biological samples and is designed for automated operation.
2 The world's most advanced high-resolution, high-speed camera inside Titan films the sample at 400 frames per second, fast enough to see individual electrons passing through the samples.
3 At C-CINA, Titan is embedded into an automation pipeline consisting of several computers for automated sample filming, image processing and 3D reconstruction.
4 Salmonella bacteria like this one have secretion systems – their molecular weapons – that can be seen in detail using Titan's electron tomography (here in collaboration with the Basler lab at the Biozentrum).
5 Titan's high resolution is sufficient to see individual amino acids in proteins, so that an atomic model of the protein can be built.
6 Samples are studied at liquid nitrogen temperature using cryo-electron microscopy.
7 Atomic models of proteins can be 3D printed for a better understanding of their mechanisms. These models of apoptosis-related proteins were deciphered together with the Hiller lab from the Biozentrum, and 3D printed at a scale of 1:20,000,000.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Microfactories in the body.

Can you imagine having a tiny factory under your skin or in your body? A biochemical machinery that produces antibiotics or cancer medication when required?

Text: Tim Schröder

No longer any need to swallow tablets or take antibiotics that also attack the intestinal flora. The tiny factory would produce only as much as necessary – and at the exact point in the body where it was required. This may sound like science fiction, but for chemist Wolfgang Meier at the University of Basel, it is by no means far-fetched.

Meier has been working on miniscule nanoreactors for more than 10 years, microscopic synthetic bubbles in which targeted biochemical reactions can take place. The factory stage is still a long way off, but the initial steps have proved promising. Together with his colleagues, Meier has already developed a precursor to a microscopic antibiotics factory. He works with polymers – special synthetic materials. In his laboratory, he has mastered the art of forming the synthetic molecules into tiny beads structured in a similar way to living cells or cell components. Meier allows these beads to absorb various substances, which then react with one another inside the bead to produce the desired product – such as antibiotics.

The trick? First, the beads absorb substances that are a precursor to the actual agent. Only when the substances in the bead react with another substance is the end product – and the desired agent – produced.

Antibiotic production on the spot

In the case of antibiotics production, Meier filled the beads with the enzyme penicillin acylase, which has the ability to convert a precursor substance into an antibiotic. In a laboratory test, Meier showed that this was possible. First, he mixed the bead filled with penicillin acylase with a culture of Escherichia coli bacteria. At first, nothing happened. But when he added the precursor substance for the antibiotic, the bacteria began to die off. Meier explains the principle of the process: “First, the inactive precursor substance penetrates the bead through the lightly porous shell and is then converted to an antibiotic by the penicillin acylase. The finished antibiotic then leaves the bead and kills off the bacteria.” The experiments are still taking place in laboratory vessels. However, Meier will soon be using cell cultures to test whether this antibiotics production works in living cells too.

Meier has an extensive support network on which he can rely. He is Director of the large-scale National Center of Competence in Research (NCCR) Molecular Systems Engineering (MSE), which has been working on the molecular factories of the future since mid-2014. A total of 29 research groups are involved from the University of Basel, the Federal Institute of Technology (ETH) and other academic institutions. The Swiss National Science

Wolfgang Meier
Chemist Wolfgang Meier is the Director of the National Center of Competence in Research Molecular Systems Engineering. Here, molecular factories are developed with the aim of producing active agents to fight disease in the human body.

Foundation is providing CHF 16.9 million to support the first four years. The size of this National Center of Competence in Research alone indicates the importance of developing molecular systems. If they succeed in building microfactories, the potential would be enormous. Synthetic vesicles could be placed in the direct vicinity of cancer cells and then administer inactive precursor substances to the patient. These would be converted into the active agent in the synthetic vesicles directly at the tumor site and the patient would be saved the strain of chemotherapy with all its side-effects.

Meier envisages combining different synthetic vesicles to produce a complex chain of production: "Substance A would be produced in the first vesicle. This would then move to the neighboring vesicle and be transformed into substance B, and so on."

Although Meier has already shown that this works in principle, there are still some obstacles to overcome. The questions to be answered do not just relate to chemistry, which is why the NCCR MSE brings together biologists, chemists, engineers and physicists. For example, biophysicist Daniel Müller from the Department of Biosystems at the ETH in Basel is working to optimize the reactions in the microfactories. "In a living cell, the site of a biochemical reaction and the number of molecules involved are precisely defined to ensure an optimal procedure. We want to find out how to ensure optimal process control in our synthetic cell factories by regulating them in this way." So far, it is also unclear how the energy for the chemical reactions would be generated in the microfactory, says Daniel Müller, Co-Director of the NCCR MSE. In living cells, many biochemical reactions are driven by high-energy molecules. The researchers do not yet know whether they will be able to use these energy suppliers for the microfactory too.

Center for development of microfactories

Funding for the NCCR MSE is initially limited to four years. However, this can be extended twice, allowing the NCCR to be funded for a maximum of 12 years. The funds are currently being used to finance several professorships and a whole range of doctoral work. "This ensures that the doctoral and postdoctoral students involved dedicate themselves entirely to MSE and can work without other academic commitments," says Meier. "We consider research into molecular systems to be so important that we are currently developing our own Master's degree program in Molecular Systems Engineering, which students at the University of Basel and the ETH will be able to attend in the future. By doing so, we want to train experts in our field in good time to be able to drive forward our basic research." The NCCR MSE is also providing support specifically for female scientists. Among other things, a scholarship is available to female researchers with children to allow them to combine research with family life.

Meier and his colleagues know that new technologies can present risks. For example, the potential hazards of genetic engineering and nanoparticles have been the subject of public discussion for many years. From the outset, the NCCR MSE will therefore thoroughly investigate the possible consequences of using microfactories in the human body. An ethics board has been set up, and at the University of Zurich, an entire project team is explicitly focusing on the potential ethical, social and political consequences of molecular systems engineering.

Fighting malaria with synthetic bubbles

Meier is convinced that MSE offers a wealth of opportunities and will play a particular role in the treatment of diseases in the future. In one current research project, he has shown that his tiny synthetic vesicles have what it takes to keep malaria in check. To do this, Meier and his colleagues synthesized vesicles that target the merozoites on the surface. Merozoites are pathogens that are released in the body of an infected person during a malaria attack and penetrate and destroy the red blood cells. Through molecular attachment, Meier has structured the synthetic vesicles in such a way that they affix themselves to the surface of the merozoites and block them. This prevents them from attacking the red blood cells. These initial successes in the NCCR MSE are promising. Nevertheless, Meier cautions against setting expectations too high: "We are just getting started." ■

Few regrets in the face of death.

Text: Christoph Dieffenbacher

Psychology

People who take time to think about death do not regret as much in their lives as one might imagine. One reason for this could be that we do not, when we come to contemplate our mortality, wish to endanger our self-esteem and so we somehow reinterpret the past.

'Non, je ne regrette rien': Composed in 1956, the song was recorded by Edith Piaf (1915–1963) in 1960. Photo: Keystone/EPA Photo/AFP/STR

'My Way': Frank Sinatra's (1915–1998) version of the song was released in 1969 in the USA. Sinatra would always end his concerts with this number. Photo: Keystone/Photoshot/Starstock

'Non, je ne regrette rien', sang the French singer Edith Piaf, when she was already seriously ill with cancer, three years before her early death in 1963. In her chanson, which she dedicated to the French Foreign Legion, she says she regrets neither the bad things nor the good things in her life, neither past liaisons and cares nor past joys – all of this was of little concern. The saying, which suggests that life is too short to regret things past, is also widely known. And yet there is also the widespread belief that the more intensively we think about our own deaths the more we regret about our lives: either that we should have done some particular thing or other or that we should not have done it. Hence the current popularity of such books as *1000 Places to See Before You Die* and *The Top Five Regrets of The Dying* – to name but two of these current bestsellers.

A threat to self-esteem

A team from the Department of Social Psychology at the University of Basel wanted to understand more about this and so they conducted a series of experiments designed to clarify the question of whether human beings, on contemplating death, are more or less likely to display regret. Those questioned were not, however, people who were actually terminally ill or dying but rather people chosen from a variety of age groups, and in fact more from younger age groups than anything else. Some will be astounded by the results of the study, now published in the periodical *Journal of Experimental Social Psychology*. Lead author Selma Rudert summarizes the findings thus: "A person confronted with the topic of death develops fewer feelings of regret regarding their life so far." Together with Professor Rainer Greifeneder, the young PhD student moved to Basel two and a half years ago from the University of Mannheim. She also conducts research on social exclusion as a threat to self-esteem.

For the study on regret, people were specifically asked in the course of three test series to imagine themselves in a situation shortly before their own deaths and to write down their thoughts regarding death. The test persons in the control group were asked to write down their thoughts on the (relatively harmless) topic of toothache. All participants were then distracted by way of another task and then, ultimately, were asked to record in writing everything that they regretted when they looked back at their lives. In one of the tests it was also possible for the participants to choose statements from a prepared list. This list included items such as 'I regret not having spent enough time with my family' or 'I regret my decisions regarding my education or my professional career'.

Interviews online and in the lab

For all three groups, each of 85 to 116 individuals, the effect was the same, says Rudert: "Test persons who have, shortly beforehand, written about their deaths record fewer things that they regret in their lives." There was, in contrast, no difference between them and the comparison group when test persons were also asked to look back at their lives and to write down positive responses. In other words: Thinking about death reduces the negative memories while the positive memories remain the same. The answers analyzed came from one online survey from the in and one from Germany, and from a survey of psychology students in a laboratory at the University of Basel. The average age of the students was a little over 20, while the average of participants in the other surveys was higher.

But what is it exactly that older and younger people most regret in their lives? Is it, for example, their relationships with other people, their commitment to their careers or how they spent their time? What are the main subjects of regret? These differed widely in the different groups, and ranged from a person's regret at not having spent more time with their grandmother to another's regret that they had not concentrated more on school when they were young. It is known from research in social psychology that individuals tend to regret what they did not do more than they regret what they did do. This finding was confirmed by the Basel research.

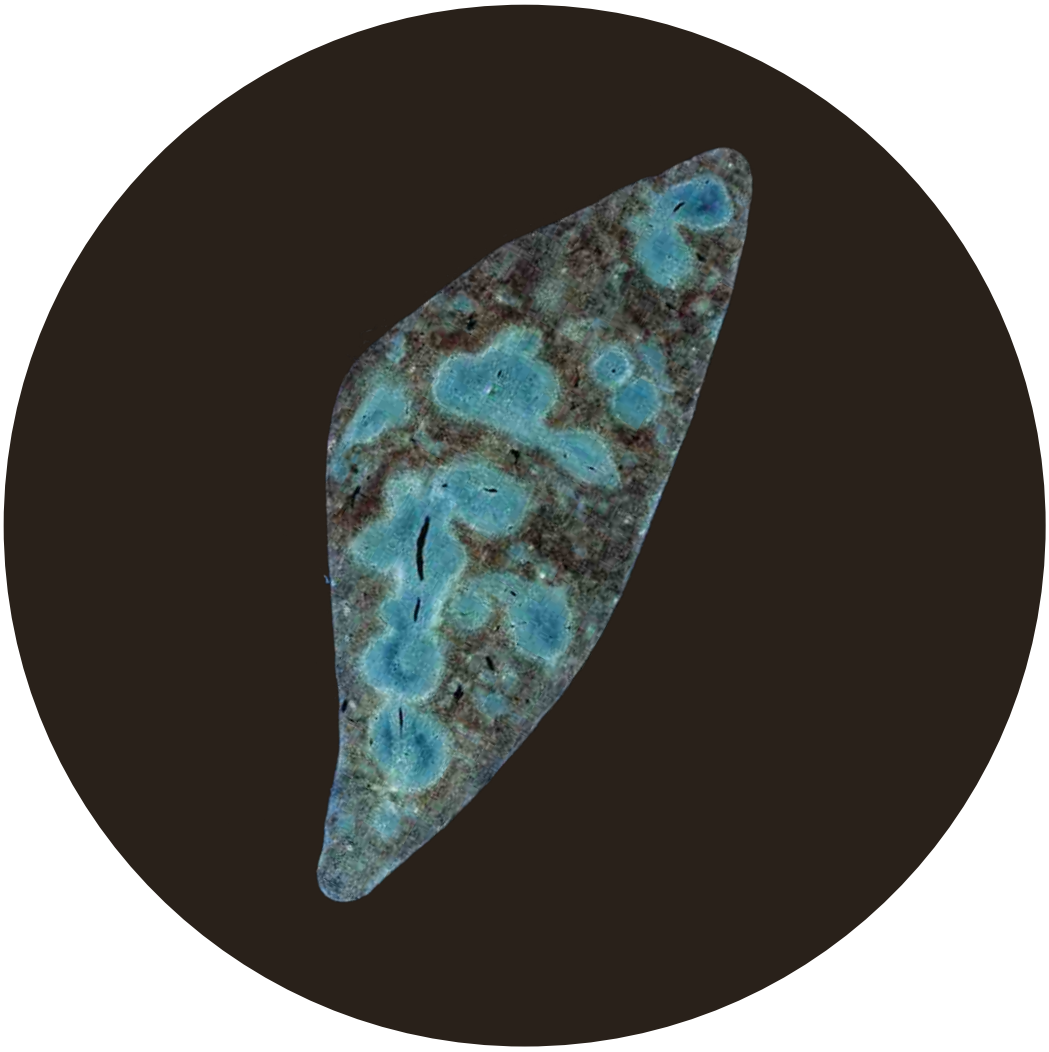
Theory confirmed

The results, Rudert further explains, confirm and expand a particular theory in her discipline: the terror management theory. According to this, people who are confronted with their death want to protect and increase their own self-esteem – and, at the same time, the culture and society to which they belong and that will survive them. Applied to the Basel study, this would mean: that individuals who reflect on their own mortality do indeed, at first, feel frightened, but they react to the threatening prospect of death by viewing their lives and their surroundings as important – a view that maintains their self-esteem and indeed increases it. "Our assumption is that in these circumstances we relativize the negative things in our lives or, indeed, most likely reinterpret them as positive," says Rudert. People want to make their own deaths appear in as positive a light as possible and they want to cling to the belief that they have lived a meaningful life.

Regret has a positive effect in that it is possible that previous mistakes are not repeated. The negative side, the damaging and paralyzing side to regret, is, however, equally strong. If pushed to draw a conclusion from the study, the psychologist says, it would be this: "When we contemplate death, the negative aspects of our lives become less important." Contrary to what is suggested in current book titles, one's aim in life should not be to avoid reasons for future regret. This is not to say, of course, that all of this can be directly applied to people who are facing imminent death. According to Rudert, the results could, however, be significant for developmental psychology, palliative medicine and geriatric psychiatry, and also, perhaps, for caregivers, doctors and families of patients.

'Regrets, I've had a few/But then again, too few to mention', are the words of American singer Frank Sinatra's 1968 song 'My Way', in which, shortly before his death, an old man contemplates his life so far. He has come to terms with his mortality and takes responsibility for what he has and has not done in life: "Yes, it was my way," he sings in the last line of the song. Yet, Frank Sinatra outlived the release of his song by quite some time – by almost 30 years. ■

Selma Rudert
Lead author on the study, Selma Rudert has a diploma in psychology and is currently completing a doctorate in the Department of Social Psychology at the Faculty of Psychology.



Cross-section of a spleen infected with salmonella.
The bacteria have spread throughout the entire tissue, where they multiply at different speeds. The light-blue areas contain B and T-cells, which fight the pathogens. They are surrounded by a border of light-colored scavenger cells. In between we see areas in which old red blood cells are collected and broken down; the black areas are blood vessels. Combining hundreds of such tissue cross-sections enables a three-dimensional analysis of the rate at which an infection develops in the various tissue areas.

When sleeper cells cause problems.

Infectious diseases are becoming increasingly hard to treat. Slow-growing bacteria in particular are making therapy difficult.

Text: Karin Bundschuh

Dirk Bumann is a professor at the University of Basel's Biozentrum. The infection biologist studies the molecular mechanisms of interaction between hosts and pathogens with the aim of developing new strategies to tackle infectious diseases.

There is a fair amount of injustice among infections. Some pathogens enjoy perfect conditions. They have all the nourishment they need and can reproduce in their millions. Meanwhile, entirely identical bacteria in the immediate vicinity end up starving and can multiply only at a sluggish rate.

These unequal conditions in one and the same organ are significant not just for the bacteria, but also for their host. While one course of antibiotics is usually enough to put a stop to rapidly reproducing germs, their slow-growing compatriots can endure high concentrations of antibiotics over days, weeks or even months without any sort of permanent effect. Dirk Bumann and his team have shown how this leisurely development allows them to elude attacks by penicillin and other medication without being resistant. According to the infection biologist, these "moderate, scarcely even noticeable pathogens" are primarily responsible for the recurrence of infections following antibiotic treatment.

Bacteria grow at different rates

However, Bumann, who has been researching in the Biozentrum since 2007, does not yet know why such unequal conditions occur in infected tissue. To date, little research has been conducted into where bacteria settle within an organ and how they spread within it. "It was thought that it made no difference," explains the scientist. "Classical anatomy just wasn't really on our radar for us microbiologists."

Originally from Berlin, he is sure that this will change. The entire field of research will evolve. In a recent review for the scientific journal *Cell Host & Microbe*, the professor explains why a new perspective on the relationship between host and pathogen is so exciting and rewarding. If researchers obtain more precise information about what happens to pathogens in different parts of an organ, they may be able to target antibiotic therapies more specifically and provide tailored support to the immune system in its fight again salmonella, staphylococcus and mycobacteria. But before treatment can be improved in this way, many open questions must be clarified.

Why exactly are there such major differences in environment in such a confined space? Tuberculosis is a good example of this phenomenon. "Our immune system manages to kill off many pathogens in the lungs. Directly adjacent, however, the tissue contains active loci that give bacteria access to the airways and can infect many other people," the researcher reflects. So although the host can defeat a large number of pathogens, ultimately this is not

enough, because in some instances the bacteria win. But why do the bacteria ultimately prove superior? Bumann hypothesizes that the immune system often lags a little behind in the fight against rapidly spreading bacteria.

It is also unclear which conditions contain the most pathogens when they infect the tissue. In their examinations of salmonella, the scientists in Basel established that only about 10% of bacteria happen on good conditions and can multiply in an optimal manner. The rest have to contend with a rather inhospitable environment. These pathogens are probably lacking in nutrition while being attacked by the immune system, which attempts to annihilate the invaders with low pH levels, little oxygen, aggressive radicals and defensive immune cells. However, the environment is yet to be analyzed in detail. Clarification is also required as to how infections spread in the tissue. "These questions are fascinating because they are fundamental to achieving better understanding and new treatment options. It will certainly take us many years to answer them all," surmises the infection biologist, not at all alarmed by the prospect.

Measuring reproduction in the tissue

Previously used only in brain research, three-dimensional microscopic processes are providing the researchers in Basel with completely new ways to find answers to their questions. Cutting equipment and a microscope are combined in a device that can analyze and strip an organ slice by slice without deformations. "It's like looking at sliced bread from above with an unbelievably high resolution," explains Bumann. Structures separated by just two thousandths of a millimeter can be distinguished using these high-tech devices.

The contrast is boosted with the aid of fluorescent colorant, which illuminates the bacteria in the tissue. This process now works not just with light microscopes, but also with electron microscopes. Although images are provided only in black and white, the resolution is actually in the nanometer range. This allows the membrane surrounding the bacteria to be viewed. It takes three weeks for an organ to be captured and photographed step-by-step, culminating in a terabyte of data. Analyzing this data is one of the greatest challenges for Bumann and his team. ■

Tolerant bacteria

The difference between antibiotics resistance and tolerance.

Resistance and tolerance to antibiotics are two completely different mechanisms.

Resistant bacterial strains cannot be harmed by certain antibiotics. The pathogens do not die off, despite treatment, and their growth cannot be inhibited. This also applies to their successors.

When researchers talk of tolerant bacteria, they are referring to bacteria that can endure longer periods of antibiotic therapy. Once the course of medication is complete, they can start growing again. The successors then created can be killed off by a new course of treatment at a later point – provided they enjoy good conditions and multiply rapidly.

Previously, infection biologists had assumed that only 'sleeping' bacteria that do not multiply can tolerate antibiotics. However, using salmonella, Dirk Bumann and his team were able to show that slow-growing bacteria that occur in tissue in much larger quantities than 'sleeping' bacteria' cause much greater problems during therapy. ■

Overview

Cultural Rights in Criminal Law.

Is the neglect of economic, social and cultural abuses in international criminal law a problem of positive international law or the result of choices made by lawyers involved in mechanisms such as criminal prosecutions or truth commissions?

Evelyne Schmid, a postdoctoral researcher at the University of Basel, explores this question via an assessment of the relationship between violations of economic, social and cultural rights and international crimes. Based on a thorough examination of the elements of international crimes, she demonstrates how a situation can simultaneously be described as a violation of economic, social and cultural rights and as an international crime.

This is the first book to systematically study the overlap between international crimes and violations of economic, social and cultural rights. It provides an overview of the relevance of economic, social and cultural rights for approaches in which international criminal law plays a role, be it criminal proceedings, commissions of inquiry, truth commissions, reparations programs or preventative strategies. It proposes solutions to some of the most difficult challenges relating to the legacies of widespread human rights abuses in the aftermath of armed conflicts and other situations of violence ■

Essays

Face and Identity.

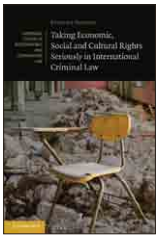
A face is considered a prerequisite for being looked at. We encounter faces everywhere in our culture of images: in politics, economy, and advertisement as well as in the arts and nature. Moreover, the face and its image date back to the dawn of human societies and the arena of human identity. How can we explain the fact that the human face moves us?

The essays gathered in this volume offer perspectives from different disciplines where the face holds a key position. They continue the multilingual discussions on this subject matter as they were developed in a collaboration between the NCCR Iconic Criticism (eikones) at the University of Basel, the Istituto Svizzero in Rome, and the University of Applied Sciences and Arts (FHNW) in Basel. ■

Research and practice

One Health.

The One Health concept of combined veterinary and human health continues to gain momentum, but the supporting literature is sparse. In this book – edited, among others, by several researchers from the Swiss Tropical and Public Health Institute – the origins of the concept are examined and practical content on methodological tools, data gathering, monitoring techniques, study designs, and mathematical models is included. Zoonotic diseases, with discussions of diseases of wildlife, farm animals, domestic pets and humans, and real-world issues such as sanitation, economics, food security and evaluation of the success of vaccination programmes are covered in detail. With a discussion of how to put policy into practice, and with studies throughout, this book combines research and practice in one broad-ranging volume. ■



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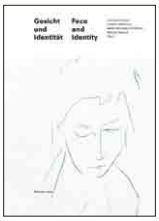

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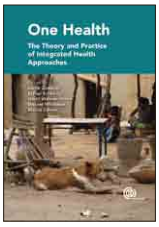

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1 Evelyne Schmid: Taking Economic, Social and Cultural Rights Seriously in International Criminal Law. Cambridge University Press 2015, £75.00.

2 Gottfried Boehm et al. (ed.): Gesicht und Identität / Face and Identity. Wilhelm Fink Verlag, München 2015. 327 Seiten, Fr. 57.80.

3 One Health. The Theory and Practice of Integrated Health Approaches. Edited by Jakob Zinsstag et al., CABI Publishing 2015, 480 Pages, £125.00.

"With Europe in our backpack, Africa as a sparring partner, the world in our sights."

Africa at a European university

Text: Antonio Loprieno

The university as we know it is an eminently European institution – not in the sense, of course, that there are no universities on other continents, or that European universities are better, more authentic or more open than their American or Asian counterparts, as even a cursory glance at the many empirical measures available makes clear, but because the particular form of accessing knowledge that we associate with universities is the product of three successive cultural breaks in the history of *Europe*. The first, which led to the establishment of the medieval university as a theological *school*, was brought about by the integration of Aristotelian philosophy into Christian scholasticism. The second took place during the early modern period, when humanists divided up knowledge into categories largely equivalent to our modern *faculties* or disciplines, geared towards the training of social elites (judges, clerics, doctors, writers etc). Finally, the Enlightenment led to the third break, between ideological and *scientific* knowledge, providing the template for the modern university. Although the university's constituent elements clearly have their origins in the social and intellectual history of Europe, the resulting product has proved so attractive that it has been taken up – particularly in its Anglo-Saxon variant – by knowledge traditions in Africa and Asia based on very different cultural assumptions.

A university like ours is, therefore, part and parcel of *European* intellectual history. But does that require us to approach other knowledge traditions from a *eurocentric* perspective? In one sense, a Swiss university is inescapably eurocentric, as our academic institutions' financial dependence on the cantons leads them to emphasize local concerns, perhaps to an even greater extent than universities in other European countries. At the same time, Swiss universities are at the forefront of efforts to raise awareness of the diversity of human experience in terms of history, economics and scholar-

ship. Globalization presents a challenge to the university, as the prototypical site of knowledge production. Should traditional curricula be adapted to reflect the change arising from globalization, or ought we instead to promote our own concept of knowledge and scholarship in other regions of the world that are of scholarly, social or economic interest to us?

The right prescription probably involves a balanced combination of the two. Classically, the orientalist method was the approach favored for the study of foreign traditions at the Humboldtian university. This involves applying European interpretative categories to the high culture of a foreign civilization (either ancient or contemporary) so that it can be integrated into the canon of university disciplines. Examples include Islamic studies, a discipline that codifies the cultural characteristics of (mainly historical) Islam so that they can be studied, and Sinology, a subject involving the academic study of the literature, language and religion (again mainly historical) of East Asia. The paradigmatic example of this approach, at the interface between eurocentrism and xenophilia, is Egyptology, which enjoys a particularly high profile at our university.

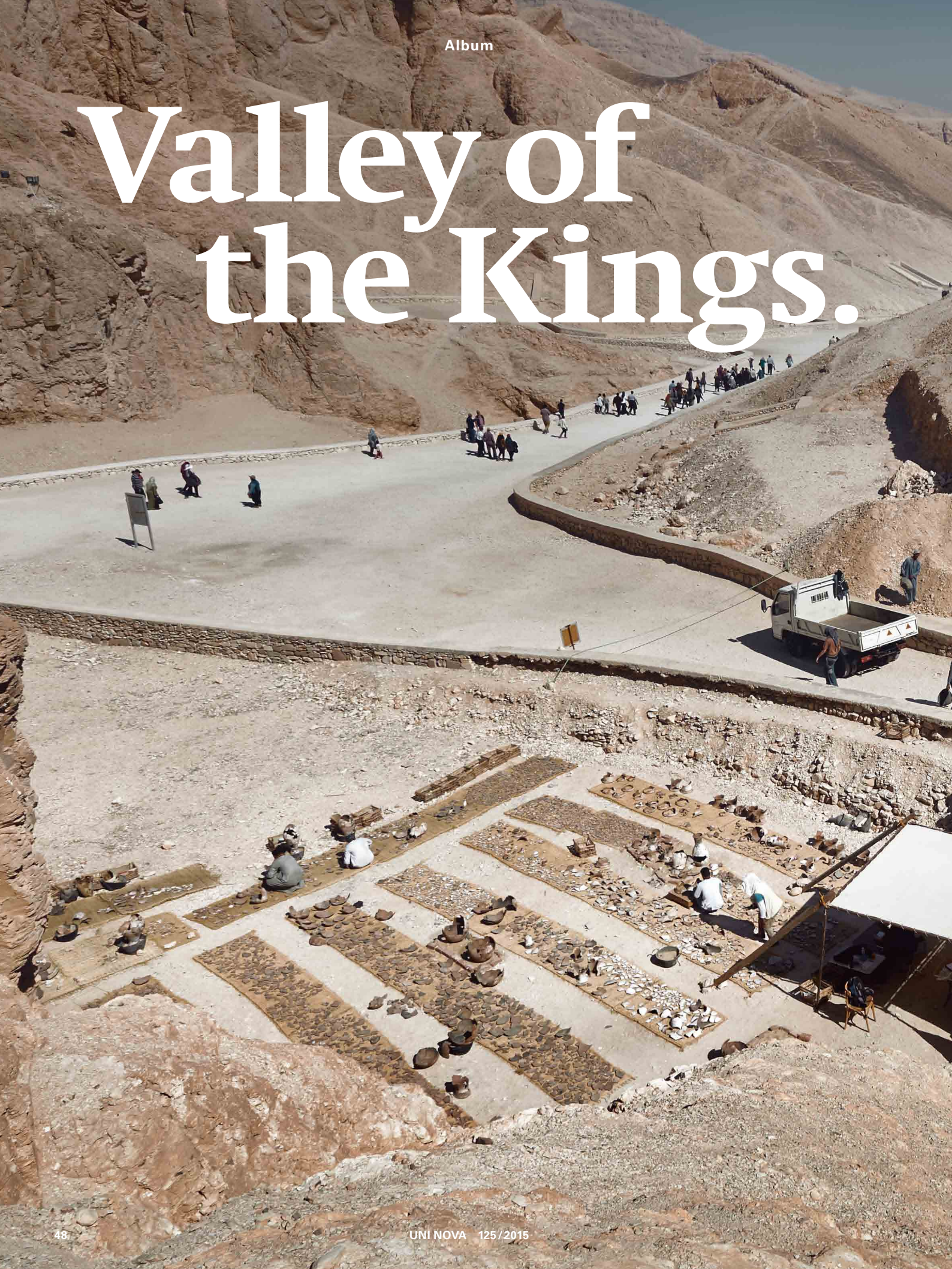
However, as a corollary of the loss of ideological supremacy by Europe and North America, the orientalist method has lost its hegemonic control over how foreign cultures are interpreted. On the one hand, we cannot escape the all-encompassing demands of an academic community that is becoming ever more global, including the increasing use of (pseudo-)English as the lingua franca of scholarship. At the same time, with the partial removal of local conventions, we have a unique opportunity to make our university's voice heard – and indirectly, but no less clearly, to articulate the academic and ideological concepts and values we stand for – in a globalized world. But that world is very big. We have to start somewhere, especially in an academic culture that prioritizes competition and innovation. For the University of Basel, the *continent of Africa* presents almost a natural choice, particularly given that the only orientalist discipline represented here, Egyptology, deals with the study of an ancient African culture. We have no wish to shut ourselves off from the great countries and cultures of Asia, given their huge importance on a global level; here, too – as in the case of China – we can benefit from the internationalization of scholarship and seek to raise the profile of our university, its values and its achievements. However, Africa is at the center of our efforts to make Basel a university with a global reach.

Aside from its focus on ancient Egypt, our university has already built up a variety of scholarly links with Africa, which can be traced back to different historic forms of engagement with the continent. In theology, for instance, the field known previously as missionary theology – now termed Christianity in Africa – which looks at the impact on religious values of contacts between Europe and Africa, has its roots in the pietistic plans of the Basel missionary movement. In the social sciences, *ethnology* and – thanks to its strong links with foundations or collections – *African studies* have established themselves as explicitly non-eurocentric disciplines. The end result was the designation of our university as a suitable 'leading house' for the national coordination of research projects with *South Africa*. Of vital importance in this regard – and for the success of research collaboration with a number of different African countries – was and is our close relationship with the *Swiss Tropical and Public Health Institute*, which serves as a beacon of excellence globally for the university in science and medicine. Finally, this fertile mix of historical continuity and scholarly innovation has given rise to a close and intensive partnership with the University of Cape Town in the field of urban studies – perhaps the most visible sign of our sustained engagement on the global stage.

With Europe in our backpack, Africa as a sparring partner, the world in our sights, we seek to offer our researchers and students the scope for impact that is appropriate to the times, to enable them to keep on negotiating and internalizing the difficult but unavoidable compromise between the local, which supports us, and the global, which we support. ■

Antonio Loprieno is Professor of Egyptology and Rector of the University of Basel. During his period in office – which began in 2006 and will continue until the end of July – the University of Basel has developed to become a center for African research in Switzerland.

Valley of the Kings.



Who were the non-royal tombs carved into the rocks for? On location with the University of Basel Kings' Valley Project.

Photos: Matjaz Kacicnik

A tomb becomes an office. The Basel archaeology project is examining 11 burial places of the Pharaohs that have not yet been archaeologically explored. Although they are located in the Valley of the Kings, they were not built for Pharaohs but rather – as ongoing research has made clear – for the wider family circles of the first rulers to be buried here in the 14th century BC.
www.kv64.ch

A walk-in jigsaw puzzle
Several thousand fragments from a single tomb are patiently pieced together. The reconstructed objects are an important reference point for the purposes of dating; they also provide information on the identity of the individual buried there, on funerary rites, and on economic processes and institutions.

In addition to the international, interdisciplinary team of researchers and the students from Basel, local workers from the nearby upper Egyptian village provide essential support for the project. The annual excavations, lasting two or three months at a time, are an important source of employment. The excavation work in the Valley of the Kings is supported by well-known members of AlumniBasel. Further information on page 63.

Most burial chambers were plundered both in ancient and in more recent times. The mummies of members of the Pharaoh's court were also badly damaged and were found in 2013 lying in the middle of the burnt-out remains of their tomb paraphernalia. Only in tomb KV 64, newly discovered in 2012, was it possible to recover the untouched remains of a singer buried in the 9th century BC when the tomb was used for a second time.

Susanne Bickel lived in Cairo for more than 10 years, where she worked for the Swiss Institute for Egyptian Architectural and Archaeological Research. In 2006, she was appointed Professor of Egyptology in Basel and currently heads The University of Basel Kings' Valley Project.

Perspectives on Europe and the world at large.

Ralph Weber likes to cross boundaries. As assistant professor at Basel's Institute for European Global Studies, his frame of reference is global rather than Swiss or European.

Text: Julia Konstantinidis Photo: Basile Bornand

Ralph Weber has been assistant professor of European Global Studies at Basel's Institute for European Global Studies (EIB) since December 2014. It took him some time to settle into his office, as it is located on the second floor of a villa with grounds in the city's Gellert quarter. With its antique furniture, walls painted a soft light blue and views of the surrounding stately gardens, Weber's workplace is the antithesis of the functional atmosphere typically found in academic environments. However, it is only fitting that the person working in these unlikely surroundings should be Weber, since he, too, has followed his own path in his career. After a doctorate in political science, he then completed his postdoctoral 'Habilitation' in comparative philosophy at the University of Zurich's Faculty of Arts. Among other things, his research focuses on Chinese politics.

Looking beyond Europe

As an undergraduate at St. Gallen, Weber, who has roots in eastern Switzerland, had already dealt with political philosophy, a subdiscipline of political science. Ever since he took a course in Chinese history during his exchange year at Geneva's Graduate Institute of International and Development Studies, the Far East has held a fascination for him. "Having learned Chinese and gained some experience of doing research on China, I feel able to write with some confidence about the country. That said, I don't pretend to make any contributions to Chinese studies as such." Weber, who is now 40, was almost destined to develop a perspective that reached beyond Europe: "I was born to Swiss parents in South Africa. After I came back to Switzerland, people used to ask me about my native country's apartheid regime, which led me to take an early interest in non-European politics." Weber's main research areas include the study of political philosophy in China, where much of the relevant intellectual discourse is subject to pressure from the country's Communist Party (CPC). One thing he is interested in is the background behind current local research in the discipline, which is controlled by the CPC: "Certain interpretations of Confucianism and other strands of philosophy do raise questions as to the party's hidden agenda. In many cases, you'll find philosophy being used as a means to a political end." However, he is convinced that China shares some of its concerns with Europe, such as environmental protection or the peaceful coexistence of different religions. In addition, he feels that the dissimilarities between Chinese and European philosophy are often exaggerated.

A professorship with scope for freedom

Weber's approach, which straddles disciplines as well as cultures, makes him ideal for a role at the EIB, particularly considering the institute's newly defined focus on European Global Studies. "An interest in Europe requires that you take an interest in the rest of the world," Weber explains. With titles such as 'Introduction to Intercultural Philosophy', 'Problems in Critiques of Eurocentrism' and 'Local Experiments in the People's Republic of China in the Light of Political Theory', the courses and seminars he teaches reflect his international outlook. "European Global Studies is still evolving as a focal area, which makes work all the more exciting," he says. Whenever he talks about his research, his enthusiasm is visible. "This professorship allows me a great deal of freedom," he adds.

Married with two children, Weber admits that his around-the-clock job can be difficult to reconcile with his private life. Still, he values the opportunity to exchange ideas with colleagues at the institute who work in disciplines such as law or history. Among other things, he says, this helps him avoid becoming overconfident in his work, which he thinks is beneficial: "I find that it helps me grow." ■

Ralph Weber was born in Johannesburg, South Africa, in 1974, and studied Political Science (Politics, Economics and Law) at the University of St. Gallen and Geneva's Graduate Institute of International and Development Studies. He later had study stays at the University of Hawaii at Manoa and Peking University. Subsequently, he became a research assistant in the Department of Political Science (headed by Professor Roland Kley) at the University of St. Gallen, where he obtained his doctoral degree in 2007. From 2008 to 2014, he was part of the University of Zurich's University Research Priority Program (URPP) Asia and Europe, working, among other things, on a postdoctoral 'Habilitation' thesis on comparative philosophy. Since December 2014, he has been an assistant professor of European Global Studies at the University of Basel's Institute for European Global Studies.

A new director, an award-winning researcher and positive annual accounts.

Jürg Utzinger in the field in Côte d'Ivoire. Photo: Swiss TPH

New head of institute

Jürg Utzinger replaces Marcel Tanner as director of Swiss TPH.

On June 30, 2015, Marcel Tanner will hand over the reins of the Swiss Tropical and Public Health Institute (Swiss TPH) to Jürg Utzinger. Under Tanner's leadership, the institute has spent the last 18 years developing an outstanding international reputation in infection research and epidemiology. At the same time, the Swiss TPH has become a sought-after partner for health programs at the WHO, the Swiss Agency for Development and Cooperation (SDC) and the Bill & Melinda Gates Foundation in Africa, Asia and South America.

Tailored education programs in health management draw students from all over the world to Basel. During his tenure, Tanner particularly supported academics from low-income countries and invested in the set-up of partner institutions in Tanzania, the Ivory Coast and Chad. Under his management, the Swiss TPH has grown from 150 employees to more than 700.

The appointment of Utzinger promises continuity and the harmonious development of the Institute. He has been a Group Leader at the Swiss TPH since 2003 and Associate Professor of Epidemiology at the University of Basel since 2010. His research into neglected helminthiases, such as schistosomiasis, has brought him international recognition. In his new role as director, Utzinger can look forward to many challenges, such as increased global mobility, the spread of chronic diseases and aging western societies. ■

Canada Gairdner International Award

Award for Michael N. Hall.

The Canada Gairdner International Award is one of the world's most prestigious prizes in the field of medicine. On March 25, 2015, the Gairdner Foundation announced this year's winners, which included Michael N. Hall. Professor of Biochemistry at the Biozentrum at the University of Basel, Hall has made a name for himself over the years through various honors. He was awarded the Louis-Jeantet Prize and the Marcel Benoist Prize, and was last year's winner of the highly endowed Breakthrough Prize in Life Sciences. Hall has been researching at the Biozentrum for more than two decades, which is where he made his award-winning discovery – the protein kinase target of rapamycin (TOR). After years of intensive research, it became clear that TOR exercises central control over cell growth and is involved in the development of a range of diseases such as diabetes and cancer. With this award, Hall has once again received one of the greatest accolades possible. "Scientists know no greater reward than the recognition of their colleagues – and the Gairdner Award is the most recent example," says Hall with delight. ■

Michael N. Hall has been conducting research at the Biozentrum for almost 30 years. It was here that he discovered the protein kinase TOR (target of rapamycin), which plays a key role in cell growth. This achievement has garnered several accolades, most recently the Canada Gairdner International Award.

Annual accounts 2014

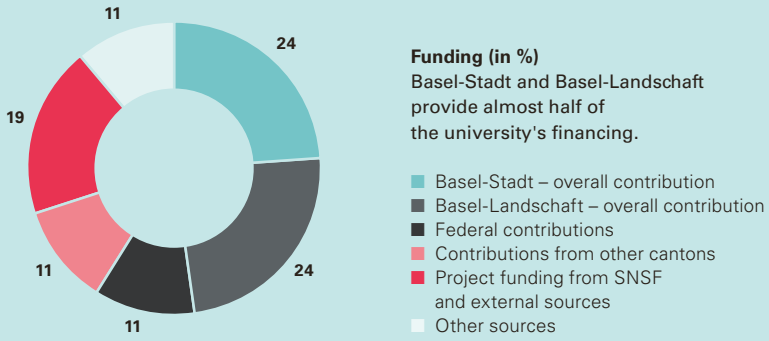
Positive balance thanks to budget discipline and additional income.

The University of Basel closed its accounts for 2014 with expenditure of about CHF 707 million and a profit of CHF 6.7 million. This positive result for the first year of the third performance period (2014–2017) of the state contract creates room for maneuver for the implementation measures of Strategy 2014, which is limited yet necessary based on the financial planning for 2015–2017. The annual report 2014 has been approved by the University Council.

In fiscal year 2014, the University of Basel had a total expenditure of CHF 707.4 million against an income of CHF 714.1 million, resulting in profit of CHF 6.7 million. This result for the year – which is an improvement on the 2014 budget (+ 5.5 million) and the previous year (+ 3.2 million) – was achieved primarily due to higher income and, as in previous years, a high degree of budget discipline among all organizational units at the university.

Public financing of CHF 472.4 million (previous year: CHF 458.4 million) consisted predominantly of global contributions from the two supporting cantons of Basel-Stadt (CHF 161.1 million) and Basel-Landschaft (CHF 159.9 million), government contributions in accordance with the federal law on financial aid to universities (CHF 74.1 million), and contributions from other cantons of CHF 75.6 million in accordance with the Intercantonal Agreement on Universities.

In 2014, the university achieved total income from external funding of CHF 147.1 million, an increase of CHF 21.8 million compared with the previous year. This income is made up of project funding from the Swiss National Science Foundation (SNSF) of CHF 69.4 million and further awards totaling CHF 77.7 million from equally competitive international research programs, special federal programs, other ring-fenced project funding, and private external funding. ■



Anniversary

Ten years of AlumniBasel.

Alumni culture is a big deal at the University of Basel.

AlumniBasel, the official alumni organization of the University of Basel, was founded 10 years ago in February 2005, and has achieved a great deal in the ensuing years. Member numbers are constantly growing (around 5,300 in 2014), there is great demand for events and activities, and many alumni assist their alma mater or faculty on a voluntary basis. Above all, more action is being taken by the faculties themselves, as they increasingly recognize the opportunities and possibilities presented by alumni work and come to value the benefits of AlumniBasel as an umbrella organization. We work together with existing associations in law, business, and medicine. AlumniBasel has also been actively supporting the establishment of new subject-specific alumni organizations since 2013. Since then, three new and very active alumni organizations have been set up – AlumniGeschichte, AlumniGeo and AlumniNano – with more set to follow soon.

As well as being proud of this growth and rising reputation, we are particularly pleased with the close collaboration between AlumniBasel, the university and the Rectorate. This takes various forms, including this year's renewed contract between the university and AlumniBasel and the involvement of Rectorate members on our board. Above all, however, it is the numerous joint activities – such as events, the recently established fundraising Christmas mailing and the new, upcoming alumni award for outstanding student work – that really drive alumni work and allow us to support our university, its research and teaching in the best possible way.

A university can succeed only if it is aware of, maintains and develops its potential. With the foundation of AlumniBasel 10 years ago, the University of Basel sent out an important signal. Now, its task is to continue with and build on this success. Get involved! ■

Roland Bühlmann is president of AlumniBasel. He studied Biochemistry at the University of Basel and later founded his own company, Bühlmann Labs, in Schönenbuch. He still owns the company today.

June 23, 2015

Anniversary General Meeting 2015.

The AlumniBasel General Meeting takes place once a year in a special location at our university and gives attendees the chance to find out about a specific area of research. After last year's meeting, which was hosted by the 'Egyptians', this year will see us in Africa – to be more specific, in the beautiful rooms of the Basler Afrika Bibliographien in the Klosterberg, Basel.

Alongside a special framework program compiled and performed together with the Center for African Studies at the University of Basel, we will be giving alumni a deep insight into current fields of research. As usual, the Rector will talk about the fortunes of their alma mater and will be available to answer any questions during the following drinks reception. ■

Alumni can register via the website www.alumnibasel.ch

Master's student Yasmin Müller photographs small objects as a study inside a tomb in the Valley of the Kings. AlumniBasel provides significant support for this research. Photo: Matjaz Kacicnik

Generous alumni

Alumni donations for students and royal research.

AlumniBasel has launched its first joint project with the university's central fund for higher education advancement just in time for its 10th anniversary. Donations were collected for Professor Susanne Bickel's excavation project in the Valley of the Kings and for the University of Basel's scholarship funds: "Professor Bickel presented her Kings' Valley Project at our General Meeting in summer 2014 and received a positive response from the alumni present. So it seemed only natural to choose this project for our fundraising campaign, particularly as Professor Bickel had told us that further funding was required," says Dr. Bettina Volz, general manager of AlumniBasel. But the Egyptologists were not the only ones to benefit from the generosity of the alumni – the University of Basel's scholarship funds also received ample support, with some alumni committing to annual donations. The idea to include the scholarship funds in this fundraising campaign came from Caroline Mattingley-Scott, who has been heading University Advancement at the University of Basel since May 2014. "Scholarships are a great way to get alumni involved with future generations of students. Everyone remembers their time as a student and knows that it is not always easy to reconcile studying with paying your way, particularly during your degree," she says. About CHF 30,000 was collected within just a few weeks, with donations varying from CHF 100 to more than CHF 5,000 and beaming faces among organizers and recipients alike. "All donations are welcome!" says Mattingley-Scott. Thanks to the money received, Bickel was able to add another student to the excavation team, and the scholarship funds will be able to meet the increasing need for support. "It is very important to us that 100% of alumni donations benefit these projects: every franc donated by alumni goes straight to the project in question!" emphasizes Volz. The fundraising project for the scholarship funds is set to become a permanent fixture. Information about past and future projects can be found on the website or obtained directly from the general manager of AlumniBasel. ■

Madeleine Herren-Oesch is an historian specializing in the history of the 19th and 20th centuries. Since 2013, she has been head of the University of Basel's Institute for European and Global Studies.

Madeleine Herren-Oesch

The History Manifesto – wide awake and ready for action.

"The book's digital format is integral to its message."

Last year was marked by an unusual event in historical scholarship – the publication of a history manifesto by Jo Guldi and David Armitage. It ends with the call to arms: "Historians of the world, unite! There is a world to win – before it's too late." To reach the widest possible audience, the authors published their appeal in a very up-to-date form, though one that is still a rarity in academic circles. *The History Manifesto* was the first book to be offered as a free download by Cambridge University Press, on an open-access basis. The book's digital format is integral to its message. Guldi and Armitage call for a history that cuts across period divisions, a public-oriented longue durée. What reads at first glance as a yet another attack on the supposed pointlessness of the humanities is in fact the opposite. The contention is that governments, businesses and politics have become dangerously short-sighted and need not less but more history.

The book caused a major splash and, of course, plenty of controversy. Its arguments are framed on a grand scale. The issues it identifies as relevant to history include climate change, economic inequality and global governance. These big subjects should not be the preserve of historians at the end of their careers, but should be reflected even at PhD level. BIG history requires BIG data. Those in turn can be accessed only via digital methods, which *The History Manifesto* strongly urges historians to adopt.

Is the manifesto the right way of securing history's future as a critical human science and a corrective influence on public life? Yes, according to its two authors –in an age swamped with data, it is the job of scholarship to combat dangerous myth-making and short-sighted decisions. With elegant irony, they compare the age of the university as an institution with the average half-life of businesses – a mere 75 years. By the time you reach this point in the book, if not before, you will be wide awake and ready for action. ■

unibas.ch/aktuell

A selection of events June – October 2015.

Wed, June 3, 8:15pm–9:15pm

Limitations in antibiotic therapy: new natural active ingredients

Lecture by Professor Gabriele König, PharmaCenter, University of Bonn; Naturforschende Gesellschaft in Basel (NGiB); Vesalianum, lecture hall, side entrance Vesalgasse 1, Basel.

Thu, June 4, 6:15pm

From microscope to molecule – a sharper view of the patient for the pathologist

Public 'Habilitation' lecture given by Dr. Kirsten Mertz, associate professor of pathology; Faculty of Medicine, University of Basel; Natural History Museum Basel, Aula, Augustinergasse 2, Basel.

Thu, June 11, 6:15pm

Molecular pathology – providing important guidance in diagnosing and treating tumors

1/2: Public 'Habilitation' lecture given by Dr. Michel Bihl, associate professor of experimental medicine; Diffuse large B-cell lymphoma – one name, many faces

2/2: Public 'Habilitation' lecture given by Dr. Sylvia Höller, associate professor of pathology; Faculty of Medicine, University of Basel; Natural History Museum Basel, Aula, Augustinergasse 2, Basel.

Fri, June 12, 6:15pm

Living or writing (Leben oder Schreiben)

Exhibition opening by Narrator Warlam Schalamow; University Library, Schönbeinstrasse 18–20, Basel.

Thu, June 18, 6:15pm

On the fascination of social cognition and personality in dementia

Public 'Habilitation' lecture given by Dr. Marc Sollberger, associate professor of neurology; Faculty of Medicine, University of Basel; Natural History Museum Basel, Aula, Augustinergasse 2, Basel.

Thu, June 25, 6:15pm

Stress-free birth – the best entry into life?

Public 'Habilitation' lecture given by Dr. Sven Wellmann, associate professor of pediatrics; Faculty of Medicine, University of Basel; Natural History Museum Basel, Aula, Augustinergasse 2, Basel.

Wed, July 1, 8:15pm

Designing new active ingredients: computers build molecules

Lecture by Professor Gisbert Schneider, ETH Zürich; Naturforschende Gesellschaft in Basel (NGiB); Vesalianum, lecture hall, Vesalgasse 1, Basel.

Thu, July 2, 6:15pm

Antibiotic resistance – primordial defence or modern resistance?

1/2: Public 'Habilitation' lecture given by Dr. Sarah Tschudin Sutter, associate professor of infectiology; Status epilepticus – from chasing demons to artificial coma

2/2: Public 'Habilitation' lecture given by Dr. Raoul Sutter, associate professor of neurology, specializing in neurointensive medicine; Faculty of Medicine, University of Basel; Natural History Museum Basel, Aula, Augustinergasse 2, Basel.

Wed, September 9, 6pm–7:15pm

The Buxtorf Torah Scroll and other manuscripts and prints from Basel University Library (UB Basel) and the Jewish Museum of Switzerland

with Dr. Gaby Knoch-Mund, Jewish Museum of Switzerland, and Anne Dietsche, UB Basel; University Library Basel: Evening events 2015; University Library, lecture hall, 1st floor, Schönbeinstrasse 20, Basel.

Thu, September 17, 6:15pm

Ten percent growth in ten years: how is this changing life in Ethiopia?

Lecture by Hans Hurni, Berne; Geographisch-Ethnologische Gesellschaft Basel: Lectures for the winter session 2015/2016: Theme: World changes / world chaos (‹Welt-Umordnungen / Welt-Unordnungen›); Geography building, lecture hall, 5th floor (elevator), Klingelbergstrasse 27, Basel.

Fri, September 18, 1pm–2am

Uni-Nacht – Long Night of Science at the University

with afternoon events for schools; Kollegienhaus and other University of Basel locations

Fri, September 18, 6pm

Thea Sternheim and her world

Exhibition opening; University Library, Schönbeinstrasse 18–20, Basel.

Thu, October 15, 6:15pm

Georgia – a hopeful new dawn following the post-Soviet decline?

Lecture by Lorenz King, Giessen Geographisch-Ethnologische Gesellschaft Basel: Lectures for the winter session 2015/2016: Theme: World changes / world chaos (‹Welt-Umordnungen / Welt-Unordnungen›); Geography building, lecture hall, 5th floor (elevator), Klingelbergstrasse 27, Basel.

Thu, October 29, 6:15pm–8pm

Basel History Lecture

with Professor Ute Frevert, Director of the Max Planck Institute for Human Development, Berlin; Department of History, University of Basel; University Kollegienhaus, Aula, ground floor, Petersplatz 1, Basel.