University of Basel

UNI NOVA

University of Basel Research Magazine — N°127 / May 2016

Latest in sleep research

Restful slumber.

In conversation
New research field: Robots and the law.

Debate
What is good development policy?

Album
In South China's megacity in the Pearl River Delta.

Research
Green diversity in the city.

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Team

Contributors to this issue:

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2 

3 

1 **Christian Cajochen** runs the Centre for Chronobiology at the Psychiatric Hospital of the University of Basel and helped to develop the concept for this issue of UNI NOVA. His subject area has completely overturned the idea that humans are beings without their own sense of time. Page 16–19

2 **Christian Flierl** has been a photographer since 2001 and regularly works on his own projects. Most recently, he published Völlig losgelöst (Completely Detached), which looks at the architecture of the 1970s and 1980s in the Basel region. He also created the images for this issue's focal area. Page 14–35

3 After a Bachelor's degree in Media Studies and English and a Master's in European Studies (both at the University of Basel), **Yannik Sprecher** is currently working as an intern in the Communications and Marketing department. He spent a night in the sleep lab at the Centre for Chronobiology for UNI NOVA. Page 20–21

A sleepless society.

It affects a third of us. Around 30 percent of the Swiss population are said to suffer from sleep problems: Difficulties falling and staying asleep, loud snoring and waking during the night, waking up early, struggling to get out of bed in the morning. If you spend your life feeling tired, not only will you be irritable and unfriendly, you will also be less efficient, make more mistakes, and have almost double the number of accidents. In this country, more than 50,000 workplace accidents each year can be attributed to sleeping problems. People over the age of 30 who sleep for less than seven hours per night and work more than 50 hours per week are at particular risk. Tiredness also affects a person's appearance. These days, claiming to need little sleep – like Napoleon, who apparently slept for just four hours – seems implausible. We know that sleeping well allows the body to regenerate. And yet this is something that fewer and fewer of us have the good fortune to enjoy.

The University of Basel has several research groups studying the topic of sleep: The day-night rhythm and its deviations, its effect on physical and mental health, and the increased need for sleep among young people. Sleeping poorly appears to be connected to stress and fears. However, this does not fully explain the fact that, 100 years ago, people slept over one hour more on average than we do today.

We hope you enjoy this fascinating read!

Christoph Dieffenbacher,
Editor, UNI NOVA

Robots and the law:
Sabine Gless in conversation, page 8

UNI NOVA is also available in German and online:
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Dossier

Latest in sleep research. Restful slumber.

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The cover image for this edition is by Swiss photographer Felix Streuli.

Vegetarian Spiders

Fans of a veggie diet.

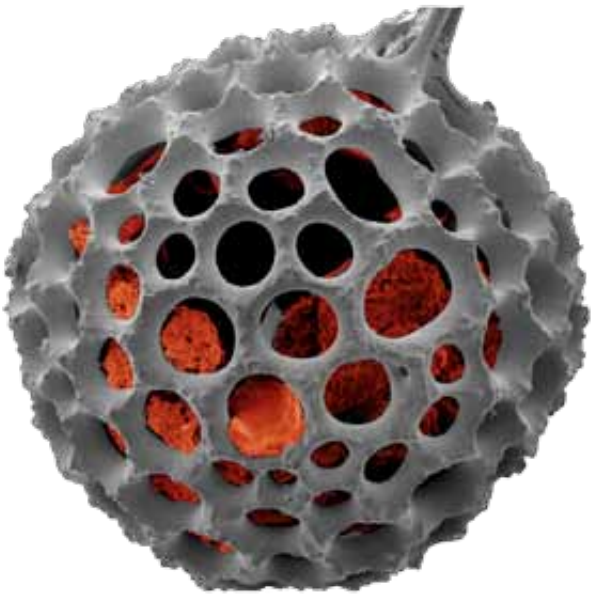
Spiders are traditionally thought of as insect-eaters, but it turns out that arachnids also like to supplement their diet with vegetarian food. This is the finding of a study in which a research team led by Martin Nyffeler from the University of Basel systematically evaluated numerous cases of plant-eating spiders. They found that members of ten different spider families feed on trees, shrubs, grasses, ferns, and orchids. The spiders also have diverse tastes, with nectar, plant sap, honeydew, leaf tissue, pollen, and seeds all appearing on the menu. "The ability to derive nutrients from plants broadens the food base of these animals; this might be a survival mechanism that helps spiders to stay alive during periods when insects are scarce," says Nyffeler. "In addition, it diversifies their diet and optimizes their nutrient intake. This can be advantageous in the fight for survival." ■

Excavations in Southern Italy

Finds from the Iron Age.

The bronze pendant depicts a couple with their arms around each other's shoulders. The piece comes from a child's grave dating to the 8th century BC and was probably part of a necklace with different pendants. It was discovered by a team of Basel archaeologists who, since 2009, have been exploring an ancient cemetery near Francavilla Marittima in Calabria where members of the local elite were buried. A new animated film tells the story of the child's grave from its creation until today and displays the archaeologists' finds. Made using 3D animation, it also lets you see the couple on the pendant from behind. ■

3D animation of the pendant and the entire excavation on: youtube.com/unibasel



Artificial Photosynthesis

Splitting water with sunlight.

They are seen as the energy source of the future. Fuel cells can generate electricity from the chemical reaction between hydrogen and oxygen. However, their sustainability is contingent on the amount of effort needed to separate water into hydrogen and oxygen beforehand, since producing these two raw materials still consumes too much energy. Scientists working with Professor Catherine Housecroft and Professor Edwin Constable at the Department of Chemistry and the Swiss Nanoscience Institute at Basel University are therefore looking for efficient ways of splitting water into its component parts, using sunlight. That is where the diatom pictured here comes into play. With a diameter of approximately 0.1 mm, it acts as a porous substrate for a catalyst that helps to split water. The researchers also use the structure of the diatom to increase and protect the catalyst's surface area. The orange-colored iron oxide within – better known as rust – works as a catalyst. The rust serves as the material for the photo-anode of a solar cell and forms part of a solar water-splitting system. ■

“Who should be punished if a child is run over by a robotic car?”

Legal academic Sabine Gless has touched a raw nerve. She argues that the law is not geared up to deal with robots that make decisions themselves – and may put people’s lives in danger.

Interview: Urs Hafner Photo: Andreas Zimmermann

The robots are coming! In some cases, they are now impossible to miss. Self-driving cars and mail vans are completing test drives and, according to their promoters, will soon be traveling along our streets. Pilotless drones are in the air taking pictures and – if the major online retailers such as Amazon have their way – will soon be delivering packages. Many robots are already part of our daily lives, even if we are not aware of it – the website Google, for example, which is correlated to our search preferences, or the scalpels used in operations.

The public are fascinated by robots. They are seen as “intelligent”, which means that they respond to their environment based on the data they are continually collecting and analyzing, they do not get tired, and they never have a bad day. Yet robots are only machines; and they are only as intelligent as their programming. “Robots have no intuition and no morality. They can’t reflect on what they are doing,” Sabine Gless says. That is how they differ from people. As an academic lawyer, Gless is grappling with the legal issues thrown up by the use of “intelligent agents”.

Sabine Gless
is Professor of Criminal Law and Criminal Procedural Law at Basel University’s Law Faculty. She is looking at the effects of digital development on the legal system. Her research specialisms are in criminal procedural law and international criminal law, especially the law on mutual legal assistance and European criminal law.

UNI NOVA: Ms Gless, you say that the legal system isn’t geared up to deal with robots. However, a robot is not a person, but a thing. The law has experience with that, so where is the problem?
SABINE GLESS: Yes, robots are machines programmed by people. To that extent, they are things. Even if they carry out functions autonomously and without human supervision – for example, if they drive cars or respond to search queries on the net – the law does not equate them with people. They are not legal subjects, meaning that they are not liable even for any damage they may cause and are not criminally responsible. However, if what many computer scientists claim is true – that in our daily lives we will soon be dealing with countless intelligent machines that are in control of themselves – in the near future people will be faced with many actors with no legal responsibility. The key question then is, who takes responsibility if something goes wrong? ›

“Robots do not feel remorse.”

Sabine Gless

UNI NOVA: Then the manufacturer is liable and the insurance company pays. Or you punish the programmer.
GLESS: That doesn't necessarily follow. What if the manufacturer and programmer are able to prove that their work was up to the latest scientific and technological standards, and they had made no mistakes? Would it be right to make a person who puts together an innovative device that we hope will improve our quality of life liable for any damage?
UNI NOVA: That would be tough for the computer scientist concerned.
GLESS: That's right. Take the example of robot carers, which are welcomed by society as a means of solving the problem of older people requiring care. Who is to appear in court for a device that has thrown its elderly patient on to the floor, instead of lifting him into bed, and possibly killing him? It is often said that society needs to see perpetrators punished; in the case of a fatal accident, how do we satisfy that need? Where a death has occurred, you can't just reach an agreement in civil law and pay for the damage – society won't stand for that. Are you suggesting that the robot be put in jail?
UNI NOVA: No, that would be ridiculous.
GLESS: Exactly. Criminal law is made for people. We punish convicted people on the basis that they feel remorse and reflect on the things they have done – in other words, that they remember them. That is an old idea that is still central to our law today. Moreover, our punishments are geared towards human sensibilities. It hurts a person to have to pay money or to be incarcerated. A robot feels no remorse.
UNI NOVA: Some computer scientists think that soon robots will be capable of that.

"Robots are not legal persons. They are not liable for any damage they may cause and cannot be convicted."

Sabine Gless

GLESS: There are also lawyers who think that. However, punishing a robot is not a convincing solution. We need instead to solve the problem of responsibility. As lawyers, we must not forget that, when damage takes place, it is the job of the law to apportion liability to the person who is responsible. If the law can't achieve that, we have a problem.
UNI NOVA: Are there any judicial precedents?
GLESS: Not yet. But that doesn't mean that there has not been damage. You find stories on the net about accidents involving self-driving cars, but nothing about legal disputes. Presumably those responsible want to avoid them and prefer to pay out.
UNI NOVA: Let's take an example. Say the police deploy a drone to carry out surveillance on a far-right demonstration, but the device comes down and kills a man. The manufacturer of the drone would then be taken to court.
GLESS: Not necessarily. It is not clear who is to blame here. Is it the manufacturer, the police, or maybe a hacker who has tampered with the device? There is nothing to stop the lawmaker holding the manufacturer liable for all damages resulting from use of the drone, even where he himself is not at fault. We call that strict liability. But the manufacturer would probably ask why the seller or user of the drone shouldn't be liable as well.
UNI NOVA: So the case of the fatal drone accident could end without anyone being convicted?
GLESS: As the law stands, yes. That is not uncommon. Fatal accidents can take place even if no one makes a mistake. If a ski instructor decides, despite a high level of avalanche risk, that it is safe to take a group out, having made a

careful assessment of the conditions, and then a block of snow comes down, killing a student, we don't necessarily blame him for that. The difference with a robot that causes harm is that there we are consciously giving a machine the power to make decisions that could result in damage.

UNI NOVA: And the party responsible is not subject to criminal law.

GLESS: Yes. That is why legislators need to decide how responsibility should be apportioned.

UNI NOVA: Robots are not generally at the center of legal attention. Are you a voice crying in the wilderness?

GLESS: No. I am not the only person, or even the first, to engage with this subject. However, jurisprudence tends not to deal with issues until they come before the courts. The world has changed considerably in the last 20 years, particularly because of the internet.

UNI NOVA: Doesn't the law always lag behind new developments, anyway? I am thinking, for example, of family law in relation to same-sex parenthood.

GLESS: Yes, in many instances the law is too conservative. But its inertia also has positive sides. It can't constantly be absorbing every conceivable socio-political current. That is the job of politics.

UNI NOVA: You take some of your arguments from science fiction films or literature. Are there people in the academic community who think, "Gless is going off the rails?"

GLESS: (laughs) No one has ever put it to me like that. Actually, in art you come across a lot of visionary ideas about the relationship between society, technology, and the law. Shakespeare and Dürrenmatt thought through some fundamental issues around guilt and the law. Literature and films often highlight social conflicts and how the law tries to resolve them.

UNI NOVA: What is distinctive about the law's approach?

GLESS: As lawyers, we think that we can resolve conflicts of interest in society by creating and enforcing suitable rules. In that we differ from economists, for example, who seek to resolve conflicts by creating systems of incentives to motivate people to behave in particular ways.

UNI NOVA: Does the law really have a chance, faced with the might of the digital giants?

GLESS: It won't be an easy battle. The situation today has been compared with the period following the industrial revolution, when the state had to rein in the new captains of industry. It is no accident that people describe data as the new oil. I think the legal concepts we have are sufficient. The question is, can we enforce them?

UNI NOVA: Do you know of any successful examples?

GLESS: Google, for instance, was required by the German courts to monitor its search engine. If an automatically generated search query violates someone's personality rights by linking them to prostitution, a sect, or a criminal offense, for example, Google must block the query so that a libel is not repeated over and over again.

UNI NOVA: What can the law learn from that case?

GLESS: That its starting point needs to be where the virtual becomes tangible in the real world, in the behavior of manufacturers, service providers, users, and licensing authorities. Lawyers need to sit down and have a conversation with computer scientists, technicians, and academics in the humanities and social sciences. If the law and technology don't collaborate, there is a risk that we will have gaps in responsibility.

UNI NOVA: So responsibility lies with the state and with industry?

GLESS: It lies with everyone, including civil society. We should be under no illusions – industry will pursue its own interests. Google is not interested in the "right to be forgotten". Everyone who uses intelligent devices, is active on the net, and leaves behind data tracks needs to deal with the resulting conflicts of interest: Who do those data belong to?

UNI NOVA: Who do they belong to?

GLESS: That is an extremely controversial issue. First, we need to clarify what "belong to" means in each specific case. An item of data or information isn't a piece of bread that you can put in your pocket. The only thing that is clear is that we need to tackle these questions. The more digital development speeds up, the easier it becomes to control us and the greater the danger to our freedoms. People are becoming more aware of that, I think. I started researching this area in Basel a few years ago because my eyes were opened by questions from computer science students attending my lecture on internet law. ■

Erasmus, Europe and Good Teaching.

European Campus

Together in Europe.

In December 2015, the Universities of Basel, Freiburg, Upper Alsace, and Strasbourg and the Karlsruhe Institute of Technology founded a "European Grouping of Territorial Cooperation" (EGTC). The higher education institutions are aiming to use this legal form to create shared structures and collaborations across borders. Among the aims are to agree an alignment on strategic planning, develop joint study courses, and establish infrastructure for shared use. "Eucor – The European Campus" is the first EGTC supported solely by universities, making it a model project unique in the European Research Area. The European Campus will be officially opened on May 11, 2016, with a ceremony in the Palais Universitaire in Strasbourg. ■

eucor-uni.org

Erasmus of Rotterdam

An epochal edition.

The humanist Erasmus of Rotterdam spent over a decade in Basel, a city whose combination of humanist culture, university, and printing workshops provided him with the ideal setting for his work.

It was here, 500 years ago, that he published, through the printer and publisher Johann Froben, the first printed edition of the New Testament in the original Greek, along with his own Latin translation. With his "Novum Instrumentum", Erasmus laid an important foundation for studying the bible – and helped to advance the reformation, as Luther used the edition as the template for his German translation.

Several Basel institutions – including the university and the university library – wish to mark the anniversary by awakening interest in this farsighted individual. The Erasmus MMXVI project, which starts at the Museum of History on May 20, will bring visitors into contact with Erasmus' thoughts and actions. It also explicitly seeks a connection to the present by asking what humanism means today, and to what extent Erasmus can inspire us. Starting on June 24, an exhibition in Basel Minster, which is where Erasmus is buried, will pay tribute to the man, the prolific scholar, the priest who strove for harmony. ■

Two exhibitions pay tribute to the work of Erasmus von Rotterdam – painted here by Hans Holbein the Younger – in publishing the first Greek-Latin edition of the New Testament.
erasmusmmxvi.ch
baslermuenster.ch

Festival of Molecules

On the trail of molecules.

Chemical compounds – molecules – are everywhere in our lives. They are contained in medicines, dyes, synthetic materials, or scents, for example. Without them, it would also be almost impossible to explore sustainable energy generation, supply clean water, and grow agricultural products. The "Festival of Molecules" offers an opportunity to discover more about the significance of molecules in our everyday lives.

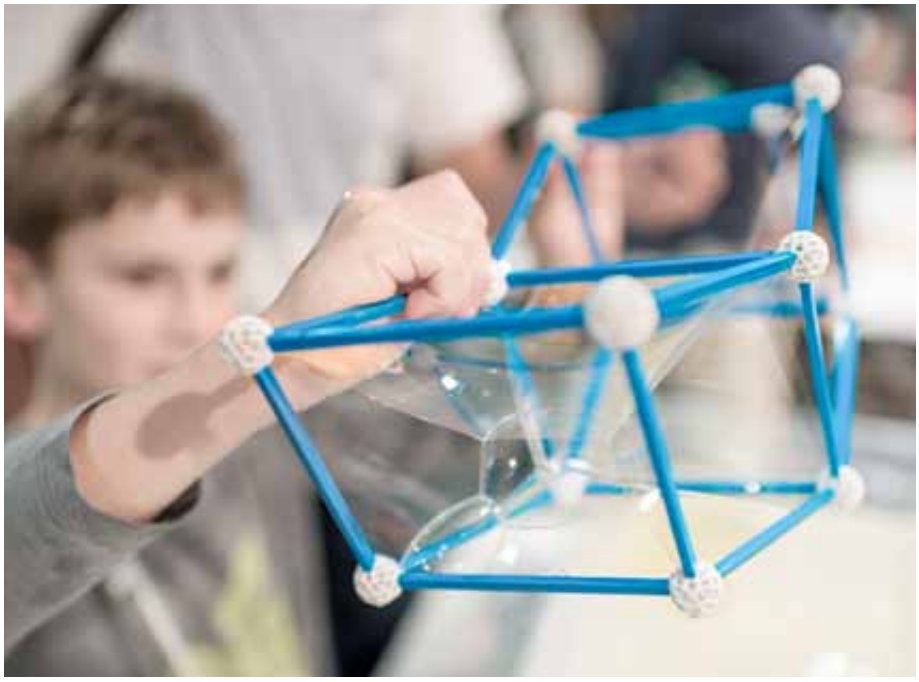
Through experiments, games, and lectures, visitors both big and small will have a chance to immerse themselves in the world of molecules and to chat to experts in the field. And the legendary Basel "Sprengvorlesung" (explosive lecture) will again feature on the program.

Organised by the Department of Chemistry, several subject areas from the University of Basel will be taking part in the festival along with the Swiss Tropical and Public Health Institute, the Swiss Nanoscience Institute, local government institutions, and chemical and pharmaceutical firms based in the region.

The "Festival of Molecules" will be held on Friday 26 and Saturday 27 of August from 10 am until 7 pm at the Kollegienhaus on Petersplatz. The Friday session is aimed mainly at schoolchildren, but everyone with an interest in the subject, especially families, is invited to come along on the Saturday, when they can get to grips with some fascinating aspects of chemistry. ■

unibas.ch/fdm

Dive in and discover: at the end of August, visitors to the Festival of Molecules will be offered insights into the fascinating world of chemistry.



Teaching Excellence Award

A tribute to good teaching.

Although it is a key aspect of the university, teaching is often overshadowed by research. Teaching gives students access to science and scholarship, inspires them, and introduces them to doing their own research. In order to recognize good teaching and raise awareness of its value, the University of Basel launched a new teaching award this spring covering five categories. "We are trying to reflect the wide spectrum of good teaching in all its variety and diversity," says Professor Maarten Hoenen, Vice Rector for Teaching and Development, explaining the reason for dividing the award.

The Teaching Excellence Award honors individuals who inspire students and who have rendered outstanding services to teaching. It will also recognize classes that give students an insight into cutting-edge research projects, and basic courses that lay a solid foundation for further study. Another category promotes the pursuit of new avenues by acknowledging innovative forms of teaching and interaction. Students are closely involved in nominating and selecting the winners. The awards ceremony will be held in the Kollegienhaus on May 23, 2016. ■

unibas.ch/tea

Latest in sleep research

Restful slumber.

Photos: Christian Flierl

Good evening, good night: Our eyes gently close, our breathing grows steady, our muscles relax, and we gradually lose awareness of our surroundings. When we are asleep, our body is in a state of rest. The precise function of sleep has not yet been definitely explained by researchers. What is clear, however, is that getting enough quality sleep is essential for our health. Various types of disruption can spoil the peace of the night.

Each person is their own clock.

Text: Oliver Klaffke

Human beings have their own sleep-wake cycles, and these rhythms can be disturbed by light emitted from smartphones and tablets. At the Psychiatric Hospital of the University of Basel (UPK), Christian Cajochen's team is examining these rhythms in human beings.

Christian Cajochen is head of the Centre for Chronobiology at the Psychiatric Hospital of the University of Basel (UPK). He is currently investigating the influence of traffic noise at night on sleep, performance capacity, and metabolism.

It is only when one no longer knows whether it is day or night, whether it is time to get up or time to go to bed, or time to eat, that one is really cut off from one's environment. "Those are exactly the conditions we create in our laboratory in order to be able to examine sleep rhythms in humans," says Professor Christian Cajochen of the UPK Basel. His work group is studying individuals' inner clocks, clocks, which function even without any external natural Zeitgeber (such as the day-night cycle) or social Zeitgeber (such as meal times or television broadcast times). The subterranean sleep laboratory has thick walls through which no sound from outside can penetrate, neither the noise from the motorway nor from Basel's airport – and certainly not the sound of birdsong in the morning. In this remoteness, each test subject's rhythm has its own individual beat. "Each person has their own rhythm, with phases of waking and of sleeping. In one individual, these may be a little longer and in another a little shorter than 24 hours," explains Cajochen. "Normally, this rhythm is adjusted to the environment by means of external Zeitgeber."

Mood and time of day

Cajochen's area of expertise is chronobiology, a science which in recent years has done away with the idea that human beings are organisms without any time of their own – permanently resilient, always ready for action, and ever able to perform to the very limit. This idea underpins the self-conception of our modern achievement-oriented society. "Our results throw a whole different light upon people's relationship with time," explains Cajochen. As with probably most animals, human beings are creatures who are subject to an internal temporal rhythm, a rhythm which cannot simply be changed at will. Physiological processes, such as digestion and the metabolism of medicinal drugs, differ depending on the time of day. A person's mood is also dependent on the time of day, as is their ability to perform complex tasks: "Human beings are clocks, and each person is their own clock."

In the sleep laboratory in Basel, Cajochen and his colleagues have studied the connection between well-being and the time of day. For all test subjects, the levels on their "Happiness Index" were lowest in the morning, between 3 am and 6 am. They were happy, or even very happy, from the early afternoon at around 2 pm through to around 8 pm in the evening. A similar pattern was recently discovered by chronobiologists in the USA when they analyzed around half a billion Twitter tweets: negative tweets were sent mostly between midnight and around 7 am with a definite low point in the mood of the tweeters at around 3 am. These results are only small pieces in the mosaic of our understanding of the extent to which people are at the mercy of their own internal clocks.

Unnatural light spectrum

"Take the example of the production of melatonin," says Cajochen. This hormone ensures that an individual becomes tired and falls asleep and eventually wakes up again. Since less melatonin is produced in our later years than in our early years, older people tend to develop age-related early awakenings and young people tend to sleep till all hours. "We were able to show that the production of melatonin is influenced by the color spectrum produced by the screens of computers, smartphones, and tablets," says Cajochen. Compared to light ›

Preparation
In a time-consuming process, electrodes to measure electrical activity in the brain are attached to the test subject at precisely defined positions.

In the corridor
A little walk along the corridor before turning in. The monitoring device can be carried around easily in a bag.

Medical residents who drive home after a 24-hour shift cause 165% more car accidents than colleagues whose shifts were shorter.

Test

Lark or owl?

Are you more an evening or a morning person – an owl or a lark? The Centre for Chronobiology has developed an online questionnaire on sleeping and waking behaviors that can help you to discover your own so-called chronotype.
bit.ly/eule-lerche-test

from electric bulbs or neon tubes, the color spectrum of these screens, which work using LEDs, has a very high proportion of blue light: "And this, apparently, slows down the production of melatonin in the body." Cajochen and his colleagues measured the concentration of melatonin in the saliva of test subjects who had been exposed to the LED light from screens and of subjects who had been exposed to light from non-LED screens. Those who had spent their time exposed to light with a high proportion of blue light had, shortly after midnight, melatonin levels which were approximately 15 percent lower than in the other group. The researchers suspect that this is the reason this group also became tired later than the others.

The work of Cajochen and other chronobiologists helps in understanding societal changes, since we now live in a "multiscreen online society," as Cajochen puts it. Young people spend around 53 hours per week in front of screens and so are exposed to a light spectrum that is not found naturally or in any previous form of artificial lighting system. That could change the wake-sleep cycle and lead us to become a society in which people are constantly overtired. In the meantime, there are already cell-phone apps that adapt the spectrum of the screen lighting to the time of day.

"Blue light is like an espresso"

Cajochen was, however, also able to determine an interesting effect of blue light on mental performance. In this experiment, test subjects had to learn new words in the evening and then later identify them correctly. Individuals who had learned the words in light emitted by LED monitors had a success rate of 60 percent. Those who had learned in light emitted by a non-LED monitor had a success rate of barely 50 percent. This result might indicate that a lower level of melatonin in the evening has a positive influence on attention. "Blue light is like an espresso," says Cajochen.

So does this mean that if you want to learn something, you should get a lamp which emits light with a high proportion of blue in it? That could work, but only in the short term. The slowed production of melatonin has a side effect that causes sleepiness in the long term: the high proportion of blue light and the resulting delay in becoming tired cause a shift in the day-night cycle of the test subjects and so disrupts their individual rhythm. Staying up later and nevertheless getting up as early as before eventually creates a sleep deficit that has to be compensated for. "People must satisfy their need to sleep," explains Cajochen. At some point, even "sleep machos" – as Cajochen terms those who power on at the cost of their sleep – have to hit the hay.

16-hour performance capacity

Early in his scientific career, Cajochen addressed the question of how long an individual can keep going and perform well without sleep. "More than sixteen hours is not possible," he says. He measured a number of physiological parameters which indicate fatigue and a heightened need for sleep. Alongside the plasma level of the melatonin, these include the circulation of blood in the fingers, the frequency of slow eye-movements, and the occurrence of episodes of microsleep. No matter which one of these variables Cajochen's team looked at, after a waking phase of approximately 16 hours the fatigue parameters rose. "That is a clear indication that after a certain period of waking, performance falls rapidly." Recognizing this was one of the greatest achievements of chronobiology. Studies in medical journals laid the myth of the high performance "sleep macho" to rest: After a night without sleep, surgeons make a fifth more mistakes and require around 15 percent longer for procedures. Medical residents who drive home after a 24-hour shift cause 165 percent more car accidents than colleagues whose shifts were shorter.

"These studies ensured that in the USA limits were set to doctors' working hours," says Cajochen. The principal beneficiaries of this were the patients, who were now treated by doctors who were more likely to be well-rested. This is a good thing, since studies have shown that the ability to concentrate and the reaction times of someone who has been awake for 24 hours are similar to those of a person with a blood-alcohol level of almost 0.1 percent. A person like that should not be in an operating room or in a position of responsibility, or be behind a steering wheel. They belong in bed. ■

Sleepless in the sleep laboratory.

Text: Yannik Sprecher

My night was not as unpleasant as I had anticipated – wearing electrodes on my head was certainly unusual, but less awkward than expected. Also, my bed was comfortable and the carers were kind. Still, I would not want to spend my nights in the sleep lab for weeks on end. A first-hand account.

The traces clearly show that you were asleep by this point," says Franziska Rudzik as we talk in the morning. She points to an array of lines on her computer screen that have little meaning to me, apparently skeptical about my claim that it took me a long time to go to sleep. One possible explanation for the discrepancy between my subjective sleep experience and objectively measured brain activity is "sleep state misperception": On waking, some people feel as though they did not get a single wink of sleep when in reality they did actually doze off. As a result, they tend to underestimate their total sleep time, explains Franziska Rudzik, who is a doctoral student at the Centre for Chronobiology at the Psychiatric Hospital of the University of Basel (UPK).

Unfamiliar environment

That ties in perfectly with my own experience of the sleep lab. I had a feeling of constantly being on the verge of sleep without ever really achieving it. Surprisingly, that had nothing to do with all those electrodes that Franziska Rudzik's colleague Laurie Thiesse had taken 45 minutes to attach to my head and face. The procedure involves having your head measured and spots marked for the sensors, which are then placed directly on the scalp. The special adhesive used sets quickly and becomes very hard, almost like concrete. Still, it is difficult not to worry about inadvertently pulling off sensors or disconnecting leads. Fortunately, I had to wear only eight electrodes. Depending on the type of test, a significantly larger number can be used, sometimes as many as 128 or even 256, says Laurie Thiesse.

After fast-forwarding the electroencephalogram (EEG) of my night in the sleep lab, Franziska Rudzik agrees with me after all: "The trace of your brain waves shows periods of greater activity – what we call arousals – at regular intervals. Something kept making your sleep shallower or even waking you." Ironically, I had specially prepared for my stay at the Center for Chronobiology by turning in extra-late the two previous nights so that I would be really tired.

It is not unusual for study participants to initially have difficulty in settling down in their unfamiliar surroundings. Many spend one or two weeks in the UPK's basement facility and so have ample time to familiarize themselves with the beds (which are comfortable) and their environment (which takes some getting used to). These participants have to be even more careful, as their electrodes are reattached only every three days.

Surprising sleep position

I had not expected to find a comfortable position to sleep in, what with the concrete in my hair, adhesive strips on my face, and electrode leads down to my hips. As it turned out, however, I quickly got used to having to turn over carefully, and the electrodes on my head hardly bothered me. Nonetheless, I did not really get off to sleep until the middle of the night. "Here you can see a nice REM phase," says Franziska Rudzik, pointing to a succession of symmetrical peaks and troughs in the

eye electrode curve. REM sleep is characterized by rapid eye movements, which is also what the abbreviation stands for. "But you wouldn't normally expect to see a prolonged deep sleep phase here, at 4.30 am. That is quite late." I probably needed to compensate for the lack of rest during the preceding hours. The finding came as no surprise to me, since I would often sleep very poorly even as a child and still tend to have trouble dropping off. Something else amazed me, however: The night vision camera footage revealed that I had rolled onto my back during the night, despite the fact that I invariably lie on my side to go to sleep. The main reason I am afraid of breaking a leg is that I would be forced to sleep on my back for weeks.

"The trace of your brain waves shows periods of greater activity – something kept making your sleep shallower."

Franziska Rudzik

Similarly, I could not imagine living in the sterile environment of the sleep lab for several weeks at a time, let alone if I were to have my ingrained sleep-wake cycle altered through changes in lighting or my sleep disturbed by artificial traffic noise. Otherwise, however, conditions in the lab are ideal: It is very quiet, the beds are comfortable and the staff is friendly and attentive. To accompany me in my laboratory experience, Franziska Rudzik also spent the night at the facility, even though I was the only participant. I showed my appreciation by letting her take charge of proceedings in the morning – she had a whole day of working on her doctoral project ahead of her.

After going over my brain wave tracing, she says, "You could definitely have done with some more sleep," which coincides with what goes through my mind every morning.

Deeper sleep with bedfellow

Typical laboratory sleepers are served three meals a day. After all, they need to stay within the grounds of the facility at all times so as not to distort the test results. I traded breakfast, which would only have caused the doctoral students more work, for the opportunity to go home immediately after a shower. The adhesive dissolved surprisingly quickly in the warm water, although washing it out was certainly less pleasant than having it gently applied. While highly water-soluble, the concrete kept getting stuck in my hair.

Unlike what many people experience, I sleep very well when my girlfriend is lying in bed beside me. "That's very interesting," says Franziska Rudzik. "You should find out why it's easier for you to relax when she's next to you. Perhaps you could find another way of bringing to mind the idea that there's somebody there for you." It is probably true that her presence calms me, but there might be an alternate or additional explanation: When we spend the evening together, I never stay up late in front of the blue-light-emitting screens of consumer electronic devices. Once Franziska Rudzik finishes her doctoral thesis, she wants to research the causes of insomnia. I would not mind being her first study participant – I could certainly manage one more night in the sleep laboratory. ■

Before sleep
The test subject in the sleeping laboratory in front of a light wall used to change the individual's circadian rhythm.

Exercise and being in love promote a good night's sleep.

What can be done when sleep is badly disturbed, and what promotes good sleep? Research groups at the Psychiatric Clinics of the University of Basel (UPK) have been addressing such questions for some time now. Exercise is good – but so is being in love.

Text: Martin Hicklin

Edith Holsboer-Trachsler is professor of clinical stress and trauma research at the University of Basel and head of the Department of Adult Psychiatry at the Psychiatric Hospital of the University of Basel (UPK).

Doing vigorous exercise in the evening before going to bed doesn't seem to be good advice because presumed common sense and popular opinion agree that it is bound to disturb the balance between sleep and waking; especially for young people who are still exposed to all kinds of other excitements. However, the opposite is true: Those who work out in the evening and consciously exert themselves are rewarded with better-quality sleep. This is not just reported by the roughly 20-year-old participants in a Basel study – it is also confirmed objectively by sleep electroencephalograms (sleep EEGs). This is good news for everyone who doesn't have enough time for sport during the day and has doubts about whether training in the evening is good for them.

Waking and dreaming

The study may not be the only one that points in this direction, but it does say something about the breadth of the sleep research conducted in Basel at the Center for Affective, Stress and Sleep Disorders (ZASS). The center is located in an impressive three-storey building in the grounds of UPK Basel (Psychiatric Clinics of the University of Basel) and treats patients for burnout, depression, and similar "disorders". For precisely this reason, the researchers there are also trying to gain a deeper understanding of how everything is linked in sleep. The center not only offers consultations for people with sleep disorders, it also has a fully equipped sleep laboratory in which all the phases of wakefulness and dreaming can be tracked in the jagged lines of sleep EEGs.

Professor Edith Holsboer-Trachsler, the center's senior consultant, clearly enjoys talking about the realistic findings regarding sport and the ability to fall asleep, which she published together with colleagues from the Department of Sport, Exercise and Health at the University of Basel in 2014. She can demonstrate two things with this study: the broad access to sleep as a key element of human well-being, and the lack of bias with which the research questions are addressed. One can imagine a continuum ranging from healthy to sick and from young to old, where healthy young people are studied as well as adults and older clients troubled by stress, disorders and chronic illness. Today, it helps that new technical possibilities increasingly enable researchers to confirm findings objectively.

Study of teenagers sparks media interest

"In addition to our medical work, we are involved in three research groups concerned with sleep," says Professor Holsboer. The first group, headed by the psychologist PD Dr Serge Brand, deals with the relationship between sleep, exercise and well-being, at the "healthy end" of the scale. They proved, for example, that sport in the morning also promotes better sleep in adolescents because it helps to reduce stress.

Dr Brand was the lead author of the remarkable study about the sleep of young people in love. It found that people who are in love suffer, albeit ›

“We have great respect for sleep.”

Edith Holsboer-Trachsler

more or less pleasurably, from a state of “hypomania”, with a heightened level of drive as well as somewhat asocial and slightly unrealistic behavior, which is termed an “affective disorder”. It was shown that teenagers who are in love sleep an hour less in this state but that they sleep more deeply. “With such positive research questions we have no trouble finding enough participants,” says Professor Holsboer-Trachsler with a smile, “the media response reached as far as Australia.” That was not the intention, but it was not unwelcome either.

With a second group, Dr Johannes Beck, a psychiatrist, senior consultant, and attending physician at the in-patient department for depression with its sleep laboratory, investigates the relationships between stress, sleep, and “neuroplasticity”, which could be defined as the associated change in the organization and sensitivity of the brain. The main interest here is what could be interpreted as signs of a change for the better. Dr Beck’s group looks for recurring patterns in the sleep EEGs and biochemical markers of patients who suffer from insomnia. It can be seen that these likely change before external changes are observed in clinical terms. They could provide early indications as to how a therapy could be better adapted.

Stress disturbs sleep in cases of depression

“We assume that stress and sleep are closely related in cases of depression,” Professor Holsboer-Trachsler explains. “If we find a reliable indicator – and we have a few good candidates – then we can also provide more specific treatment and measure the success objectively.” It is also possible to treat such disorders by intervening directly via sleep: “The patients usually feel better if their sleep disorders can be influenced in a positive manner.” Everything that promises a good treatment outcome deserves to be investigated. This can sometimes lead down a blind alley. Professor Holsboer-Trachsler vividly recalls previous spectacular outcomes often brought about by depriving severely depressed patients of sleep. If they were woken at 1.30 am and prevented from going back to sleep in the second half of the night, they usually promptly felt better by the break of day. “An incredible number of things happen in the brain with changes in the transmitters, the neural networks and neuroplasticity, as we now know,” the psychiatrist says, “but unfortunately the effect was gone after the next night’s sleep.” Sleep deprivation has therefore disappeared from the research arsenal for the time being. However, the firmly held conviction that the causes of depression can be tackled and treated via sleep still remains.

In order to be able to measure the impact of such procedures, perhaps long before anything changes in the external clinical picture, intensive research is being conducted at ZASS with chemical and electrophysiological biomarkers. This is the kind of topic pursued by the third research group, led by Dr Thorsten Mikoteit, a psychiatrist and head of the ZASS outpatient department. He can count on collaborations with the Max Planck Institute of Psychiatry in Munich for this.

“Deeper understanding”

One of the substances that can provide information about processes in the brain is the so-called BDN factor (brain-derived neurotrophic factor). This can deliver information about what exactly happens in the brain in the physical state known as burnout, but also in the case of sleep disorders. There is great hope that indicators of this kind can also be used for early prevention and treatment.

“Today, we have a far more multifaceted picture of what happens in the brain than we had previously, and some additional doors have also opened, providing gateways to a deeper understanding of the processes occurring in the brain,” says Professor Holsboer-Trachsler, “we have great respect for sleep.” She goes on to explain that, luckily, the research in her hospital plays a far greater role than it used to, which also pays off in the results: in more specific treatment strategies, in popular advice for everyday life – or sometimes in headlines that go round the world. ■

Dealing with stress.

Text: Martin Hicklin

Depression, stress, and burnout are often accompanied by poor sleep. Analysis of brain patterns and hormonal tests offer a path to improved treatments.

As the senior clinician at the Center for Affective, Stress, and Sleep Disorders (ZASS) in Basel, Dr Johannes Beck treats patients suffering from conditions such as stress and professional burnout. Sleep plays an important role as an indicator and a means of delivering treatment. As the psychiatrist explains, "Sleep disorders are among the most common symptoms of depressive disorders. Poor sleep precedes a depressive episode, and it is not unusual for sleep disorders to persist even after the depression has receded." Most people suffering from depression report having trouble getting to sleep at night, problems sleeping through and waking up early in the morning. However, atypical forms of depression may be associated with an increased need for sleep.

Johannes Beck is an attending physician at the Head of the Center for Affective, Stress and Sleep Disorders (ZASS) at the Psychiatric Hospital of the University of Basel (UPK).

"Not all depression is the same"

Although the "disorder" may manifest itself in a similar range of symptoms, its biological causes and progression vary. "Not all depression is the same," Beck says. "We try to offer each patient a targeted form of treatment. Its progress is monitored and, where necessary, it is altered and adapted as soon as possible if it is not proving effective." The aims are to reduce the length of time the patient is ill and to restore their quality of life more quickly. Research findings show that recording of brain waves during sleep (sleep EEG) can yield valuable markers for progression, response to treatment, and risk of relapse among patients suffering from depression.

Another strategy looks at the so-called stress axis. As a product of evolution, this hormonally controlled system is fundamentally "a good thing", according to Beck. In a pressurized situation, cortisol is secreted by the adrenal cortex, leading to heightened responsiveness – "fight or flight". Sugar is released, while energy-consuming processes such as inflammations are scaled back and postponed. This is pure stress – ideal for dealing with the sort of life-threatening situations we faced in the past, such as running into a saber-toothed tiger, but harmful when it becomes chronic, due to pressure of deadlines and volume of work, and the alarm system remains permanently switched on. The consequences range from difficulty concentrating, anxiety, and poor sleep through to depression and accompanying physical illnesses such as high blood pressure. It is a vicious circle.

The primary aim is to measure progression and to draw conclusions with regard to treatment. Depression is accompanied by a rise in cortisol levels, while typically sleep EEGs show a change in frequency of eye movements during the so-called REM phases. Together with the Max Planck Institute of Psychiatry, the Center is working on sleep EEGs to identify typical indicators. With the help of extensive hormonal tests, it is also becoming possible to make predictions about treatment outcomes at an early stage.

Students as fitness consultants

Beck is excited by evidence that there is a simple treatment that can be clearly shown to have a positive impact on stress: sport, which brings down stress levels. After regular endurance training, people's mood improves, their brain recovers, and they sleep more deeply. It is not necessary to run a marathon – half an hour's exercise three times a week can make a significant impact. Beck is delighted to report that twelve weeks of endurance sport can also help to remedy the cognitive deficits that are still measurably present after burnout or depression, even when people are no longer exhausted and are back in a good frame of mind.

Now, in conjunction with the Department of Sport, Exercise, and Health at Basel University, the Center is looking at whether endurance sport should be introduced at an early stage to treat depression, in order to improve symptoms, progression, and sleep by reducing stress. Sports science students are working as fitness consultants, and the results are keenly awaited. However, if you find the waiting too stressful, you can always start by experimenting on yourself. ■

Longitudinal Study

Premature babies have trouble sleeping – a problem that can continue later in life.

Text: Christoph Dieffenbacher

Psychologists at the University of Basel are currently conducting a longitudinal study to investigate whether the sleep of people born prematurely differs in later life from that of their peers. About 180 test subjects in the Basel area are participating in the study, about half of whom were born before the 32nd week of pregnancy and half were full-term babies. The study is being conducted in cooperation with the Center for Affective, Stress and Sleep Disorders (ZASS) of the Psychiatric Clinics of the University of Basel (UPK) and the Department of Neuropediatrics and Developmental Medicine of the University Children's Hospital Basel (UKBB). Results of the first wave of the study, conducted when the participants were aged between 6 and 10, show that the children who were born prematurely wake up more frequently at night and sleep less deeply on the whole. This could be associated with sleep apnea – short pauses in breathing at night, which are more common in those born prematurely. Another well-known fact is that children born prematurely are also more likely to exhibit attention deficits and emotional problems, which is attributed to the stress of the premature birth, as the psychologist Professor Sakari Lemola tells us. Interestingly, hyperactivity or disruptive behavior at school do not occur more often among children who were born prematurely, which can lead to their problems being overlooked by teachers. Professor Lemola calls for more attention to be paid to good sleep quality for children and adolescents who were born prematurely.

The study is currently in its third wave with the same children, who have in the meantime entered adolescence and are aged between 11 and 15. The issue for the researchers now is to clarify whether the tendency for children born prematurely to have difficulty sleeping also continues at this age – the very stage in life when many young people experience a dramatic change in their sleep behavior anyway. ■

Later start to the school day, more alert children.

Children and adolescents have long known it:
If school starts later in the morning, they feel more rested and fitter.
Even a small shift in school hours makes a difference,
as psychologists at the University of Basel have discovered.
Their findings have had consequences.

Text: Christoph Dieffenbacher

If the school bell rings just 20 minutes later in the morning, this is enough to have an effect on young people's sleep duration and on how fit they feel during the day, as the team of developmental psychologists working with Professor Sakari Lemola reported a good three years ago. They had surveyed more than 2,700 teenagers between the ages of 13 and 18 and came to the conclusion that school pupils whose classes begin at 8.00 am sleep about 15 minutes longer and are more alert during the day than those who already have to be in the classroom at 7.40 am.

It is a well-known fact that sleep habits change during adolescence. Children still tend to be early risers, but adolescents often have difficulty getting up in the morning and do not feel sleepy until late in the evening. While the phase in which they fall asleep shifts clearly into the night, their need for sleep remains unchanged: it is approximately 8.5 to 9.25 hours per night and therefore still similar to that of ten-year-olds. During their school life, many teenagers thus suffer from a sleep deficit that impairs their ability to concentrate and with it their performance at school and general wellbeing.

Comparison of different schools

The team of psychologists from the University of Basel had visited secondary schools in the Canton of Basel-Stadt and asked questions about sleep – such as "When do you go to bed? When do you get up? What is the situation during the week and what is it like at the weekend? How do you feel during the day?" In one of the six schools in the study, classes began 20 minutes later in the morning because block teaching was used there more frequently. It was thus possible for the researchers to make a direct comparison between the different school hours, and they obtained a statistically significant result.

The Basel study, the first of its kind in Europe, triggered a considerable response as researchers in the USA had already obtained similar results previously. Professor Lemola, who is in the meantime an assistant professor at the University of Warwick in Great Britain and adjunct senior researcher at the University of Basel, says today that he was initially surprised to discover that a fairly small shift in the start of the school day leads to a significant improvement. He had assumed that the few minutes' delay would not be of any considerable importance. ›

Sakari Lemola has been associate professor at Warwick University (Great Britain) and adjunct senior researcher at the University of Basel since February 2016. Until recently, he was associate professor of personality and developmental psychology at Basel.

Model sets a precedent

The researchers met together with representatives from the authorities, which has had tangible consequences: As of the 2015/2016 academic year, classes for grades 1 to 9 begin at 8.00 am in the whole Canton of Basel-Stadt. Meanwhile, this model is setting a precedent elsewhere, too. It is currently being discussed in the Cantons of Bern and Zürich, for instance, and also in Germany. Professor Lemola reports that he frequently receives inquiries on this topic from within Switzerland and abroad.

In order to reinforce the positive effects of sleeping later, further demands have already been made, for example for starting classes at 9.00 am. However, this would have adverse consequences not only on the breaks but also on the syllabus. Unless classes were rescheduled to go on into the evening – which would in turn not be very compatible with leisure activities such as sport and music lessons or with evening meals as a family. For Professor Lemola, though, starting the school day at 8.15 am and offsetting the shift by means of shorter breaks would be a "reasonable compromise".

From early risers to late risers

The older children become, the more their rhythm shifts in the direction of sleeping longer in the morning. The fact that they turn into evening people and morning grouches during puberty is due, first of all, to the complex biological changes, says Professor Lemola. However, research is still being conducted into the precise mechanisms of this change in the sleep-wake rhythm. This shift in sleeping habits, which lasts until the age of about 20, is found not only in our culture but also in other cultures according to the researcher. As adults, human beings find their way back to their childhood rhythm and become morning people again.

A second factor at work here, according to Professor Lemola, is what specialists describe as sleep hygiene. This refers to the lifestyle habits and behaviors that influence sleep. Here, the psychologist stresses activities late in the evening with laptops, tablet computers and smartphones, which are clearly linked to shorter sleep duration and more frequent sleep problems. Another study also found that young people who sleep less and have more sleep-related problems are more likely to suffer from symptoms of depression and ADHS. Sleep is therefore also a civilization issue: The psychologist describes studies that found that Brazilian children from villages that were not yet connected to the electricity network slept more than an hour longer than children from areas that were already supplied with electricity. This is understandable and is in line with the findings that people in Europe 100 years ago – in other words before the widespread supply of electricity to households – slept one hour longer on average than they do today. ■

"Other cultures have also noted shifts in sleeping patterns among young people."

Sakari Lemola

Self-confident adolescents sleep better.

Text: Christoph Dieffenbacher

About one-fifth of adolescents say that they sleep badly. A psychologist from the University of Basel has been investigating the reasons for this for some years and is looking for solutions. He also has a few tips for parents.

As the father of four daughters and two sons, he should know: "Young people need almost exactly nine hours' sleep at night," says Dr Serge Brand from UPK Basel (University Psychiatric Hospital) and the Department of Sport, Exercise and Health at the University of Basel. The ideal amount of sleep as found in several studies is being reduced for various reasons these days, for example as a result of quite trivial changes in circumstances: Homework, sports training, group work and activities such as visits to the cinema, the theater and concerts take place increasingly in the evening and into the night at this age. This leads to adolescents going to bed far later than they did when they were still children.

Serge Brand is a qualified high school teacher for sports, history, and Italian. Today, he teaches and researches at the Psychiatric Hospital of the University of Basel (UPK) and at the Department of Sport, Exercise, Health at the University of Basel.

Unchanged for 40 years

Dr Brand, who also works as a psychotherapist, has conducted a number of studies on this subject together with colleagues. A somewhat surprising outcome is that sleep disturbances – such as difficulty falling asleep or remaining asleep, waking too early, daytime fatigue – have not increased among adolescents in the last 40 years: "It is always around one-fifth of adolescents that are affected." Dr Brand explains that the tablet computers, smartphones or screens used by many young people before they go to bed are not necessarily to blame for poor quality of sleep, but rather that it is the other way around: Those adolescents who already have difficulties sleeping occupy themselves more with electronic media before going to bed – with the (often illusory) intention of settling down and being able to fall asleep.

So what factors promote restful sleep during adolescence? Dr Nadeem Kalak, one of Dr Brand's research colleagues, discovered that adolescents who do lots of sport sleep better – which can also be measured. This comes as no surprise. Yet the study also refuted the common belief that activities late in the evening are disadvantageous: even intensive sport one and a half hours before going to bed improves sleep according to Kalak's findings. Young people should therefore be encouraged to do regular sport, also in the evenings.

More resistant to stress

Psychosocial factors, too, contribute to a good night's sleep: Young people who feel that they are accepted by their peers, siblings, parents and teachers sleep better. The psychologist says that adolescents should therefore be given the opportunity to practice their social skills and to orientate themselves according to reliable social networks. And that's not all: Mentally strong teenagers are more resistant to stress and also report that they have more restful sleep. Young people should therefore be given the chance to build up a stable self-esteem and to formulate visions and goals of their own that can also be realized.

Adolescents who are allowed to decorate their bedroom according to their own tastes and are able to keep their room quiet and dark report that they sleep better and more restfully. In Switzerland it is standard for adolescents of the middle classes to have a bedroom of their own – but teenagers from lower socioeconomic classes in particular continue to live in less favorable conditions, as the researchers discovered.

Sleep is ultimately also a family matter, according to Dr Brand. Adolescents whose parents have no difficulty sleeping also sleep better themselves. Mothers and fathers who observe their offspring's sleep "carefully but firmly" and who intervene if necessary could even protect their children from depressive disorders. As adolescents grow older, their parents' control decreases, but "if it stops altogether, that can have a dramatic effect on adolescents' sleep and their psychological well-being." ■

Nightly respiratory arrest.

Text: Christoph Dieffenbacher

Heavy snoring accompanied by interruptions in breathing can lead to serious health problems. In Basel, pulmonologists are investigating the mechanisms that put constant stress on snorers suffering from sleep apnea. Possible therapeutic approaches are also being identified.

Not all forms of snoring are alike. In its harmless form, it is merely a nuisance for the sleeper's partner. However, a dangerous form of snoring, known as sleep apnea, is characterized by violent snorts and gasps. Basel pulmonologist Professor Michael Tamm explains the problem: Since the muscle tone in the throat is reduced during sleep, especially if the sleeper is lying on their back, the airways tend to narrow. As a result, breathing becomes shallower and may even be interrupted. In that case, blood oxygen saturation decreases after a few seconds, which in turn prompts the brain to issue an urgent command to breathe again. Respiration restarts abruptly, causing the blood oxygen level to rise – until the sleeper's throat muscles relax again and the process begins anew.

This continual up and down, explains Tamm, puts the snorer's organism under permanent nocturnal stress, of which they are unaware. However, when their brain activity is measured, the electroencephalogram (EEG) reveals that they repeatedly come close to waking. In other words, they have a bad night's sleep. Understandably, they feel sleepy and exhausted throughout the following day, have difficulty concentrating, and may even lapse into microsleep. If their condition goes untreated, sleep apnea sufferers will be unfit for certain types of work such as truck driving or chauffeuring.

Michael Tamm is professor of pulmonology, director of the lung center, and head of the Department of Pulmonology at University Hospital Basel. He treats patients with sleep apnea as well as other disorders of the airways and lung tissue.

"Affects up to a third of the population"

The medical researchers have defined a threshold for what constitutes severe sleep apnea: Anything up to five "snorting episodes" per hour is deemed normal, while an average of 15 or more is clearly harmful. Professor Tamm points out that this condition, which is known as "obstructive sleep apnea syndrome", entails a "significantly increased risk of suffering a heart attack or stroke". The risk is greatest in men over 40. Other risk factors include being overweight, having high blood pressure, drinking, and smoking. Sleep apnea can, however, affect anyone. "Up to a third of the Swiss population suffers from some form of the condition," he says, adding, "and it has recently been found that sleep apnea also occurs in children."

Modern treatment approaches focus on preventing excessive relaxation of the throat muscles. CPAP (continuous positive airway pressure) masks are worn during the night and work "like a vacuum cleaner in reverse," blowing air into the nose and thus widening the throat so that there is enough room to breathe, as Tamm explains. And it seems that these masks, which the sleep lab adjusts for each patient, are effective: "After a few days, many patients report feeling better and more awake." The University Hospital Basel alone provides CPAP masks to about 200 patients every year. As an expert in the field, Professor Tamm does not think much of aids such as nasal strips, mouthguards, and palatal expanders – or the idea of sewing a tennis ball into the back of a snorer's pajamas.

Investigating biomarkers

In a longitudinal study involving almost 300 people with suspected sleep apnea, Tamm and his team looked at specific biomarkers – potential indicators of the condition – that can identify oxygen deprivation caused by sleep apnea. The scientists discovered that one of the markers, the hormone vasopressin, is a possible indicator of untreated sleep apnea. The team also conducted another study, which found that an organic compound called adrenomedullin could potentially be used as a marker to monitor therapeutic success. Adrenomedullin, a peptide that dilates blood vessels, was examined in lung cell cultures that were given a reduced supply of oxygen.

A patient's decision to lose as much weight as possible is unlikely to help combat sleep apnea. After all, if you feel tired and drained all day, the temptation to eat snacks now and again is all the greater… ■

Reverse vacuum cleaner
Patient with CPAP mask at University Hospital Basel.

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The 25-hour man.

Each person's wake-sleep rhythm is calibrated at 24 hours. In Basel, scientists are studying a man for whom the mechanism does not work. This is providing them with new insights into human chronobiology.

Text: Oliver Klaffke

There was huge excitement when around 15 years a¨go special receptors in the retina whose job is to measure light levels were discovered," says sleep researcher Christian Cajochen. "They transmit information to the brain about whether it is day or night." The existence of a third kind of receptor, besides the well-known rods and cones that allow us to perceive colors and tones, is of huge significance for chronobiology. These receptors – photosensitive ganglion cells – explain how a person's internal clock is tuned into the daily rhythm of their environment.

"The case clearly shows that the sleep pattern sticks rigidly to the rhythm of the inner ear."

Corrado Garbazza

The importance of the mechanism becomes clear when this synchronization does not work, as in the case of a man whom Cajochen's colleague, Dr Corrado Garbazza, is studying.

Every person has their own sleep-wake rhythm, which runs for about 24 hours. It is synchronized with their environment by the change in light levels over the day-night cycle, which is picked up by all the photoreceptors, as well as by the photosensitive ganglion cells in the eye, and transmitted to the brain – specifically, to a region of the hypothalamus called the suprachiasmatic nucleus. This has its own dynamic. It is the location of the internal clock, so to speak, and works like a pacemaker – in other words, it generates the circadian rhythms. The temporal rhythms of all the cells in the body are synchronized from here. "Every cell has its own clock, which operates independently and continually has to be reset to the right time by the control center in the brain, like a radio-controlled clock," Cajochen says. This control center, the suprachiasmatic nucleus, is supplied with information about changing light levels over the course of the day via the photosensitive ganglions. In nearly all people, the system works so well, thanks to this fine-tuning, that they do not notice its effects, unless they travel overseas and suffer jetlag or they are involved in shift working. ›

Inability to synchronize

The man Garbazza is studying cannot synchronize his sleep-wake rhythm with his surroundings. At 25.27 hours, his rhythm is significantly longer than the 24-hour day, meaning that his sleeping and waking phases move around over time. The researchers call him the "non-24-hour man". If he travels to another time zone, his rhythm does not adjust to the new conditions but runs on independently. Back in Switzerland, too, his sleep-wake rhythm remains unchanged. Every day he gets tired a bit later and gets up a bit later; on average, the difference is about 1.27 hours a day. Obviously this makes it difficult for him to cope with a normal work pattern that requires him to turn up at the office at the same time every day.

The man's case was so unusual that initially the Basel researchers assumed that, rather than being due to an inability to synchronize with the environment, it must have other causes. Garbazza recorded the man's sleep-wake rhythm continuously for more than six months, determined his melatonin profile every month and analyzed the circadian gene expression in his fibroblasts. In the process, it became clear that these measurements were "running free" on a 25.27-hour cycle, and thus were not synchronized with the 24-hour day.

One of the scientists' working hypotheses – that they were dealing with an acquired behavior – was thereby disproved. For the researchers, this was clear evidence that the man's inability to synchronize his sleep rhythm had a physiological component. In the case of the "non-24-hour man", although the cells are synchronized centrally within the body, the circadian rhythm continues stubbornly to follow the time set by the internal clock. This happens because the mechanism for synchronizing it with the man's environment, according to changing light levels, does not work. That is very unusual in those with normal vision, but it is relatively common in people who are totally blind. ■

Corrado Garbazza is a physician and researcher in the fields of psychiatry, chronobiology, and sleep medicine at the Psychiatric Hospital of the University of Basel (UPK).

Tests on the optical table.

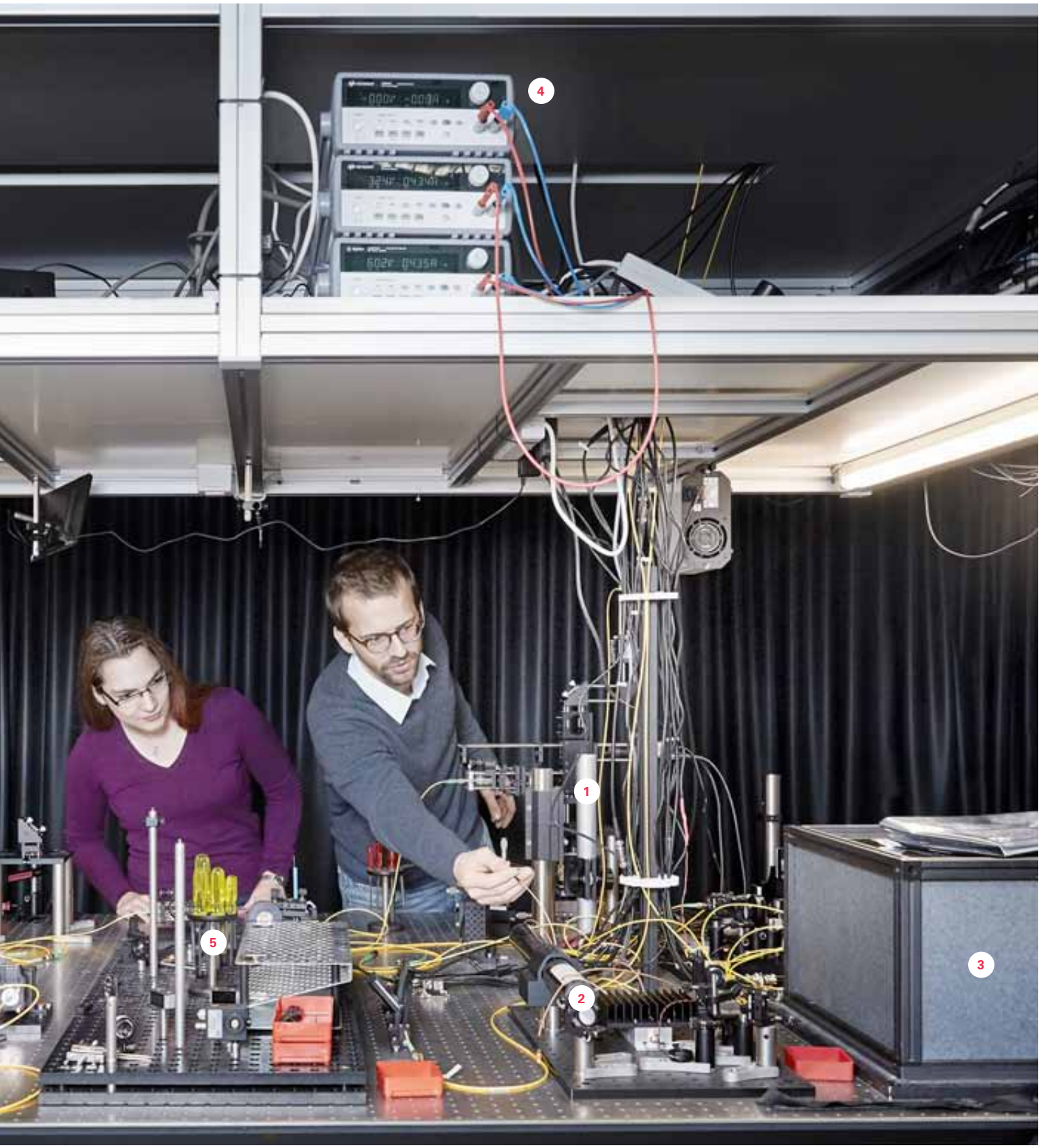
With the aid of laboratory-grown diamonds, physicists are developing highly sensitive nanosensors that can record minute magnetic fields. The procedure uses quantum-mechanical effects and, in the future, could improve medical diagnostics and enable research into novel materials.

Photo:
Basile Bornand

Patrick Maletinsky has been Assistant Professor of Experimental Physics (Georg H. Endress Professorship) in the Department of Physics at the University of Basel since 2012.

Marietta Batzer is a doctoral student researching how magnetometers made from diamonds can be optimized for use in the nano and life sciences.

1 A self-built, optical confocal microscope forms the core of the experiment. A laser is focused on the diamond crystal through a lens and the fluorescent light emitted by the diamond is collected at the same time.
2 The light source produces a laser beam that is directed via mirrors and screens to the diamond, which is situated in a magnetic field. This stimulates a specific area in the diamond lattice that contains a nitrogen atom and an adjacent empty space (a missing atom) instead of the typical carbon atoms. A few nanoseconds after the stimulation, the system reverts to its initial state and a photon is emitted (fluorescence).
3 A single photon counter can register these individual photons. The count rate enables the physicists to read the spins of individual electrons at room temperature and thus to measure minute magnetic fields in the nanometer range.
4 In addition to the microscope and the optical and electrical cables, the control electronics for the magnetic fields are also part of the experiment.
5 Tools such as brackets, poles, and screwdrivers are required to mount individual modules on the perforated plate of the vibration-damped table.
6 A new microscope is currently being installed on the left half of the table for further experiments. ■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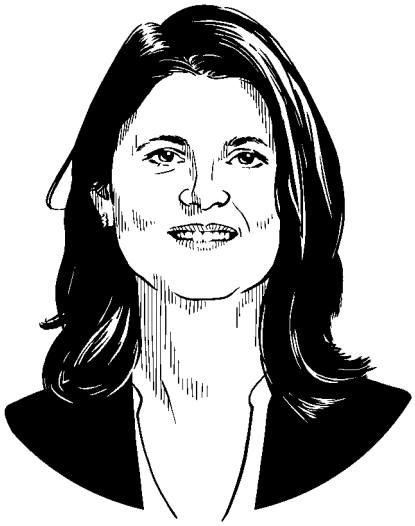
What is good development policy?

Would gaining free access to northern markets help the South economically? And how can developing countries secure functioning institutions? Two contributors discuss how the effectiveness of development aid could be improved.

Fair Trade is the title of a recent book by Joseph Stiglitz, holder of the Nobel prize for economics. However, nowhere in it does he mention the fair trade label that appears on so many packets of coffee in Switzerland. For economists, fair trade is about the North opening up its markets to the South completely, rather than just importing tropical commodities that it cannot produce itself. Stiglitz's colleague, Paul Collier, actually sees the fair trade label as harmful, as it locks the South into producing tropical commodities instead of diversifying its economy. Development agencies should therefore be fighting not for the fair trade label but to open up the economy of "Fortress Europe".

Why do development agencies today campaign for small farmers and coffee beans, rather than market access and industrialization? From an economic history perspective, it is interesting to note that this gulf between academic economics and the Third World movement appeared only in the 1980s. When professional non-governmental organizations first came on the scene, they adapted their notion of fair trade to the social context. To survive or even grow, development agencies had to keep up the flow of donations and to enter into informal alliances with the environmental movement or the trade unions, for example. The organic farming movement, which was very strong in Switzerland, launched its own label, the Bio Bud, as early as 1981. Today, environmental protection and opposition to growth are integral to the fair trade brand, which was introduced in Switzerland by various development agencies in 1992. The peasant farmer, both at home and abroad, came to symbolize the new concept of organics and fair trade. However, the corollary of this was that the political demand for Switzerland to open up its markets to all southern products and to allow the South to industrialize fell by the wayside. As a number of political-economic studies have shown, unfortunately environmental protection and opposition to growth have often been used in international trade policy as a pretext for shoring up the privileges of "Fortress Europe". In this process, the NGOs have played the role of "useful idiots".



Andrea Franc
is working on a postdoctoral project on the changing notion of fair trade in the 1970s. She has a doctorate in economic history from Geneva and is currently working at the Department of History at Basel University, where her research is funded by a Marie Heim-Vögtlin grant from the Swiss National Science Foundation.

Switzerland's first fair trade product, launched in 1973, had nothing to do with peasant farmers – on the contrary. Ujamaa instant coffee from Tanzania was an industrial product that was seen as fair precisely because it was not an unprocessed commodity and came from a modern factory in Africa. The coffee was sold at stalls all over Switzerland by volunteers with a background in economics, who handed out leaflets with it. Their aim was not to achieve sales but to "raise awareness" among the population. Switzerland needed to get used to the fact that "in future it would have to give up certain privileges". Ujamaa coffee would replace Nescafé; jobs and company headquarters would relocate to Africa. In order "to change the economic structures of our country to reflect our shared responsibility for the world of tomorrow", Switzerland would have to abolish import tariffs and other trade barriers for developing countries and open up its market not just to tropical commodities but to industrial products. By the same token, developing countries would be allowed to build up their processing industries by using import tariffs to protect their markets, unlike the West. However, Ujamaa instant coffee was the first and last industrially manufactured fair trade product to come from Africa. ■

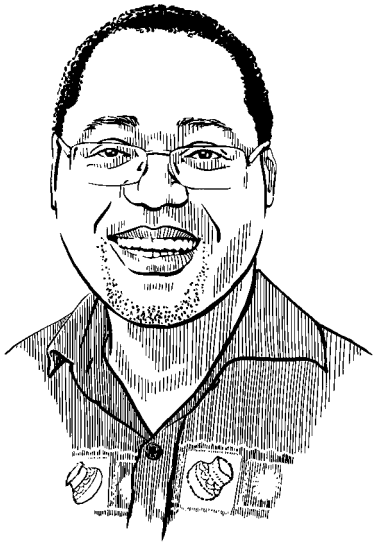
Africans must develop their own continent. They need, first, to roll up their sleeves and make better use of their resources, and secondly, to solve their problems more peacefully. Above all, however, they need better institutions and governments – and perhaps better populations. This last point echoes a suggestion by the economist and Nobel laureate Douglass North. When asked for his advice on what Russians should do to develop their country, he responded drily that they should get themselves a different history.

What is meant by this is not the sort of history that would have spared Africa colonialism and the slave trade, but a history that would have given Africa better institutions. For many economists who work on development issues, it is all about the institutions. That is because, fundamentally, development is quite simple: All you need is the rule of law, free markets, and competition. According to the top economists working on development issues – Daron Acemoglu, James Robinson, and the rest of them – this simple argument explains why good institutions are necessary. Nations fail because they lack good institutions. So why don't developing countries do these simple things? Some put it down to the fact that governments are rewarded only for short-term gains, whereas setting up and strengthening good institutions are tasks for the long term. Others think that does not happen because it is unclear who would gain from it. As a result, politicians in these countries cannot see why they should make the effort.

Now a third explanation is circulating among experts. The argument holds that politicians in developing countries fail to make better decisions for their countries because they are caught in a violence trap. Anything that disrupts the balance could unleash a spiral of violence. Indeed, statistics confirm that the poorest countries in the world are also those with the highest levels of violence – in other words, countries where governments are more likely to be brought down by force. This latent violence is said to reflect a lack of internal cohesion. Douglass North, Gary W. Cox, and Barry Weingast first wrote about this violence trap some years ago, pointing to France, South Korea, and Taiwan as examples of countries that had freed themselves from it by strengthening their internal cohesion. In the case of France, the trigger for this was the threat posed by Germany in the 18th century, while in the other two cases it was the threats posed by North Korea and China. This is the sort of clever analysis that characterizes thinking about development.

The problem with many arguments about development policy is their circularity. Countries are developed because they have developed – or something along those lines. Thus we know that good institutions are important for development because countries that are developed today have good institutions and countries that are not have bad ones. This "institutionalized know-it-all-ism", as Philipp Lepenies calls it, leaves no room for the possibility that good institutions may be not the cause but the consequence of development.

This is the key issue, as no one knows exactly how countries develop. The field of economics dedicated to solving this riddle offers nothing but intuitions, all of them with one thing in common: They are examples of petitio principii, also known as circular reasoning. The conclusion is justified by a statement that presupposes the truth of the conclusion. You need good institutions, because development means having good institutions, therefore good institutions are essential for development. We do not understand the development of Europe, but our massive development structures turn the intuitions that we have about it into certainties that we do all we can to impose on developing countries. Developing countries simply do not get round to "developing" because they are too busy trying to master the (patchy) knowledge of development experts, which promises the solution to all of their development problems. ■



Elísio Macamo
is an Associate Professor at the Department of Social Sciences at Basel University. Born in Mozambique, his main interests are the sociology of religion, technology, knowledge, and politics.

It is one of the planet's most fascinating urban regions: The world's largest megacity, which will be home to around 120 million people in the future, is being constructed in South China's Pearl River Delta. Key population centers such as Guangzhou (Canton), Shenzhen, Hong Kong, and Macau with million-plus cities in between are merging to form one continuously inhabited area. The highly industrialized region, which has a good 60 million residents and millions of migrant workers, has now overtaken the world's largest megacities.
A metropolitan model is being implemented here that is to serve as a model for other urban regions throughout the country. Based on an ambitious plan, an economic zone and living environment are being created in which state spatial planning is reducing environmental impact and providing for a growing population. Geography students from Basel have travelled to the region several times. Together with their fellow Chinese students, they learned about urban planning, industrialization, the living situation, and everyday life in this megacity region in joint seminars, visits, surveys, and through their own observations and investigations.

In China's megacity.

Photos:
Human geography students from the University of Basel

Text:
Christoph Dieffenbacher

Album

211
million

China has an estimated 211 million migrant workers: Most of the women employed in Dongguan to produce cell phones are single migrant workers from the countryside.

2.2

The region's per capita gross domestic product is 2.2 times the national average. This model shows a gated community in the Pearl River Delta.

11

The economic zone encompasses 11 cities with more than one million inhabitants and eight districts: One of the five 62-story buildings in the "Grand Waterfront", a private residential complex with a shopping center in the Hong Kong district of Kowloon.

7.8%

The region's gross domestic product grows by 7.8% each year: A bedroom in an accessible model apartment in the gated community of "Clifford Estates", most of which are available as condominium apartments at western real estate prices.

6 544

Certain areas of the Pearl River Delta have a population density of 6,544 people per square kilometer. The new "Liede Village" district with skyscrapers in Guangzhou.

Album

Rita Schneider-Sliwa is Professor of Human Geography/Urban and Regional Studies at the University of Basel. She and her students regularly travel to South China's megacity region.

Desheng Xue is Professor and Director of the School of Geography and Planning at Sun Yat-sen University in Guangzhou. He is also a partner in the exchange project.

120 million

The region, which has roughly the same surface area as Switzerland, is set to encompass 120 million people: New buildings in the high-priced "Grand Waterfront" residential complex in Hong Kong behind an older urban village of a lower standard.

Judeo-Spanish: An almost forgotten language.

Text: Olivia Poisson

In the late Middle Ages, many Jews who had been exiled from Spain or Portugal migrated to the Ottoman Empire. Their language, Judeo-Spanish, survives in a few pockets. Research on it is shedding a light on how languages in general develop.

Beatrice Schmid has taught and researched at the University of Basel since 1999 as professor of Ibero-Romance Linguistics where she heads the Judeo-Spanish research group.

If you try to read an Old English text from the 9th century, chances are that you will find it well-nigh impenetrable – not only because its content will seem foreign, but also because English grammar and spelling have changed dramatically over the centuries. All languages evolve and change continuously. In some cases, a language variety will split off from its parent language by developing divergently over time, and it is not uncommon for a language to simply become extinct. Why this is the case and how exactly the process works are some of the major questions in linguistics.

Language birth and death

At the University of Basel, Beatrice Schmid, Professor of Iberian Romance Languages, has been researching language history and language contact since 1999. Much of her work is concerned with investigating and documenting modern written Judeo-Spanish (judeoespañol) or Ladino, the traditional language of Sephardi Jews in the former Ottoman Empire. Sephardi Jews are descendants of Jews who lived in Spain and Portugal until they were forced to flee in the late 15th century. Up until the early 20th century, Judeo-Spanish was the main language of Jewish communities in the Ottoman Empire and was widely written as well as spoken. Following the demise of the empire and the formation of individual nation states such as Greece, Bulgaria, and Turkey, it was gradually supplanted by the respective nations' languages. Today, Judeo-Spanish is on the verge of extinction, but its history provides linguists with direct insight into how languages develop. "As a researcher trying to understand the evolution of languages, you're forever wondering why a particular language developed in the way it did when it might well have developed differently. Judeo-Spanish is a fascinating, living example of an alternative path that Spanish could have taken, given different circumstances," is how Schmid explains her fascination with the language.

Pioneering work

When she first offered courses on Judeo-Spanish, the subject area was receiving hardly any academic attention, and it remains a niche interest to this day. So how did she become interested in the first place? As is so often the case, coincidence played a large part: "I happened to be at a conference where two experts on Judeo-Spanish, who had a reputation for their heated debates, were scheduled to give a talk. I listened to it out of sheer curiosity and immediately became hooked," she recalls. "At Basel, I was originally going to offer a single series of lectures, along with a seminar, but my students practically forced me to carry on." That was 16 years ago. Spurred on by her students' enthusiastic participation, Schmid continues to offer courses on Judeo-Spanish every other semester.

Over the subsequent years, she established a research focus on Judeo-Spanish, which the University of Basel is still unique in Europe in offering. From 2002, Schmid and her students carried out trailblazing work, compiling the world's first large-scale corpus of written Judeo-Spanish. A corpus, a collection of texts in a particular language, is a prerequisite for linguistic research. Once the corpus had been assembled, the time-consuming task of transcribing the texts was undertaken. "From 2002 through 2006, we were busy making the corpus accessible. It was only afterwards that we began to reap the rewards of our work," says Schmid. Specifically, this means that the sources have been used since then to study the peculiarities of written Judeo-Spanish from the latter half of the 19th century onward. This work has led to four doctoral theses and one postdoctoral Habilitation thesis. Prior to the efforts of Professor

Judeo-Spanish newspaper advertisements from Saloniki around 1910: The Sephardi Jews almost exclusively use Hebrew script when writing Ladino.

The most important Sephardi communities in the former Ottoman Empire.

Schmid and her group of students, virtually no linguistic research had been conducted in this area. Only over the past ten years has the subject area gained a foothold in Israel and in the USA.

Influence of various cultures

In terms of its significance, Judeo-Spanish is to Sephardi Jews what Yiddish is to Ashkenazi Jews. It is a language that evolved over time under the influence of neighboring languages. Its origin lies in the expulsion of Jews from Spain and Portugal in 1492 and 1497, respectively. Before this turning point, Jews spoke Spanish no differently from the rest of the population. Hebrew was seldom used outside religious contexts, much like Latin among Catholics.

After their expulsion, many Spanish Jews migrated to the Ottoman Empire, taking their language with them. Sephardi communities were isolated enclaves within the multinational Ottoman state, which meant that Spanish remained their main language over the generations. Over the course of the centuries, under the influence of several surrounding languages, a distinct variety of Spanish came into existence. While the most obvious distinguishing characteristic of Judeo-Spanish is the fact that it is written in Hebrew script, it also shows many signs of influence from Turkish and Balkan languages.

No future for Judeo-Spanish Studies?

Schmid estimates that fewer than 50 linguists worldwide are currently working on Judeo-Spanish. With that in mind, what does she think the future holds for the field? "Judeo-Spanish will always sit on the periphery of linguistics. In spite of or even perhaps for this very reason, it does have a future as an academic subject area. Having said that, that future will, without a doubt, be in the USA, where many descendants of Sephardi Jews live, and in Israel, where most universities now offer Judeo-Spanish Studies as a focal area," she explains. The University of Basel has been helping to ensure a future for this area of research by producing a number of experts. For instance, the first doctoral student Schmid supervised is now a professor at the University of Bern, where she contributes to the teaching and research on this unique language. ■

ladino.unibas.ch

Natural diversity between asphalt and concrete.

Text: Yvonne Vahlensieck Photo: Ramona Melliger

The Canton of Basel-Stadt contains numerous woodlets, many of them in the city. Now, for the first time, a conservation biologist at the University of Basel is studying the ecosystem functions of these green islands in urban space.

The smallest forest fragment examined: A former orchard in Riehen.

At first, forestry research in a city does not exactly sound promising. However, a look at the statistics shows that Basel-Stadt has over four square kilometers of forest. Most of this consists not of large, continuous areas, but of several small parcels of land. These are the remnants of what were once large forests, overgrown orchards or plots that have become reforested.

Yet, can these somewhat random collections of trees in a settlement area still be described as forest? A forest serves as an ecosystem in a large number of ways – for example by offering diverse habitats for animals and plants, improving soil quality, storing water, and cleaning the air. Can small forest fragments fulfil the same role?

Ramona Melliger of the Institute of Environmental Sciences at the University of Basel is tackling this precise question. In her doctoral research, she examined 27 forest fragments of differing sizes and in different parts of the city. The largest forest examined was around 50,000 square meters in Bettingen, the smallest a former orchard in Riehen measuring 258 square meters, about the size of a tennis court. Other forest fragments were surveyed in the Bruderholz district, by the Rhine and near the Wolf goods depot.

Home to many plant species

The first and most important step in the study was recording the plant species growing in the forest fragments selected. "Plants are essential to the functioning of an ecosystem," explains Melliger. "Animals play a role too, but plants to an extent form the backbone of an ecosystem." To record the species, she installed six randomly selected squares measuring four times four meters in each forest fragment. She then documented every species found within these squares: from trees and shrubs to herbs and ferns. In spring, Melliger walked, cycled or took the tram to reach her research objects to catch as many plants as possible in the act of blooming/flowering – the easiest way to identify a species.

Even the initial results were somewhat surprising. "You would assume that the larger the forest, the more species there would be," says Melliger. However, the statistical analysis showed no relationship between the size of the forest fragment and the number of species found. For example, Melliger counted over 30 different plant species in a small forest the size of a tennis court, while some larger areas contained fewer species.

Roads and tracks hinder diversity

Still, the sheer number of species is not the only crucial factor in a healthy and stable ecosystem – the balanced relationship between the species and their abundance, or diversity, is also important. "If a plant occurs only in small numbers, then this species will make very little contribution to the ecosystem," explains Melliger. Therefore, when visiting small forest fragments she also counted how many times each species occurred. The smaller forest fragments scored significantly worse in this respect: The ground was often dominated by a single species of plant, such as ivy, while other species occurred only occasionally.

Diversity was particularly low in areas with a high building density. One prime example is the forest near the Wolf goods depot, which is completely surrounded by tracks, roads with several lanes, and buildings. "Plant diversity is very low here – the ground is almost completely covered by ivy and wild garlic," Melliger notes. Concreted and built-over areas act as a barrier for many plant seeds. In particular, species that primarily spread via roots or shoots have practically no chance to gain a foothold in such isolated fragments.

In addition to diversity, Melliger identified another key difference between large and small areas: Larger forests house many shade-tolerant plants such as the early dog-violet. In small forest fragments, Melliger tended to find species that typically occur on forest edges or hedge plants such as the graybeard. This is due to the edge effect: Small forests have proportionally more edge in relation to their area and therefore offer more habitat for species that require light and heat.

Spiders indicate disturbance

The effects of the differences in species composition identified on ecosystem functioning are not yet clear: For example, can these tiny forest fragments provide a home for a range of organisms? To answer this question, Melliger is now looking at the spider diversity in the forests examined: "Spiders have been shown to be good indicators of disturbances in ecosystems." In addition, spiders are so numerous that it is easy to collect sufficient samples.

Last year, Melliger buried more than 1,500 plastic beakers filled with soapy water in the forest soil – simple ground traps for spiders. The specimens caught using this method have not yet been counted and identified, but Melliger anticipates a yield of several thousand spiders from at least 60 different species. The composition and abundance of the species will then allow further conclusions on the health of the city's forests. Studies on ant diversity and the decomposition rate of leaves are also underway.

This will gradually produce a complete picture of the forest fragments in Basel. It will then become apparent whether, despite all these differences, they can contribute as much to the ecosystem services as large forests. For Professor Bruno Baur, Professor of Conservation Biology at the Institute, it is high time that more research projects of this type were performed: "By now, 80 percent of the world's population lives in cities – and this figure is increasing. Green spaces such as these urban woodlands will play a significant role in the wellbeing of city dwellers in the future." ■

Ramona Melliger is an environmental biologist and doctoral researcher at the Institute of Environmental Sciences (NLU) at the University of Basel.

White specks on the map of life.

Text: Katrin Bühler

How are signals processed and building blocks produced inside cells? How do diseases develop? Resolving structures of complex proteins enabled researchers at the Biozentrum to answer such questions.

Every day, his coworkers in the laboratory grow thousands of crystals – but not the kind you would usually find at mineral shows or as items of jewelry. The researchers crystalize proteins to decipher their structure and function using X-ray crystallography. For Professor Timm Maier, these are the most beautiful crystals in the world: "They may be tiny, but protein crystals are more appealing to me than any diamond. And they are not just beautiful on the outside; they also shed light on the molecular dimensions of life."

A structural biologist, Maier has been conducting research at the Biozentrum since 2011 and specializes in the giants among these tiny structures – large protein assemblies. "I am fascinated by their complexity and diversity," he says. "This is by no means restricted to their structure. We are constantly amazed by their dynamics, their multifaceted functions, and the ways in which they can be regulated. These tiny protein structures are as complex as entire factories."

Timm Maier is Professor of Structural Biology at the University of Basel's Biozentrum. With their research into the structure and workings of huge protein complexes, the biochemist and his team are gaining valuable insights into the anatomy of life.

Protein factory for fatty acids

Fatty acid synthase is one such miniature factory. This enzyme produces fatty acids, which are components of cell membranes and serve as important energy stores. When Maier began to study this enzyme over ten years ago, its structure was completely unknown. Some renowned scientists even believed that it would never be possible to clarify its structure. Maier took on the challenge – with success. "Getting to the bottom of a previously wholly unknown structure is thrilling," he states. "You see things that nobody has ever seen before, and suddenly you can understand truly fundamental processes. You feel like Columbus must have done when he first set foot on uncharted terrain."

Thanks to Maier's X-ray crystal structural analyses, we now know – in detail – how fatty acid synthase is structured: It is made up of 14 protein regions that create one long, water-insoluble fatty acid chain from small molecule components in a sequence of over 40 reactions. "Now, years after initially clarifying the structure, we are just beginning to understand the interplay of dynamics and catalysis in fatty acid synthase."

Starting points for new medications

Fatty acid synthase does, however, have a dark side too: Increased activity in this protein factory contributes to rapid tumor growth and the proliferation of cancer cells, making it an interesting target for cancer therapy. Using the structure as a basis, researchers worldwide can now investigate the binding and effects of new inhibitors.

The protein TOR plays an important role in regulating fatty acid synthase and numerous other enzymes. Together with further proteins, it forms the large TOR complex I – the control center for cell growth. Together with other scientists, Maier has

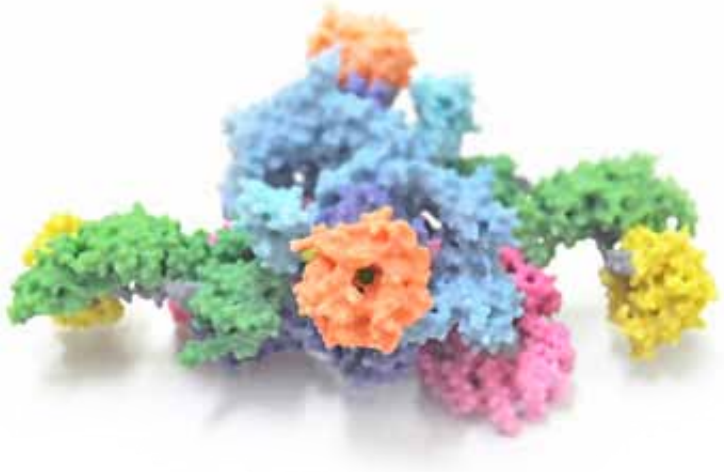
succeeded in clarifying the architecture of this huge complex. “TOR inhibitors are already being used in cancer therapy, and there is great potential for further development. The protein complex has long been one of the most important goals in structural biology,” says Maier. “Figuring out the architecture of the TOR complex was a major challenge that could only be tackled with intensive collaboration and by combining several techniques. And this is not an isolated case. We increasingly find ourselves tackling questions that can no longer be answered using just one method. We are therefore glad to receive strong support from the Biozentrum for interdisciplinary projects.”

In a recent Nature publication, Maier’s research group investigated the architecture of polyketide synthases. These enzymes occur in bacteria and fungi and serve as molecular factories for naturally occurring bioactive substances. They are natural producers of antibiotics and the TOR inhibitor Rapamycin, which gave the TOR protein its name (target of rapamycin). “We have established that polyketide synthases have an extremely variable and flexible structure,” says Maier. “During the process of evolution, their versatile structure tolerated variations of entire protein segments and, therefore, enabled the development of a wide variety of products.” This feature also makes polyketide synthases interesting for the development of drugs – with the aid of newly formed protein variants, a wide range of medication precursors could be produced that are difficult to chemically synthesize.

Detailed picture

Structural biology has changed considerably over the last few years – it has become integrative. Having previously tackled isolated questions with individual technologies, now researchers combine a wide variety of methods. Technologies range from X-ray crystallography, to electron microscopy, through to nuclear magnetic resonance and mass spectroscopy. Thanks to enormous technical progress and the variety of methods available, researchers can now – quite literally – obtain a much more detailed picture of extremely complex proteins.

“From the start, I was fascinated by the prospect of visually exploring the structures of life. We obtain three-dimensional images of proteins, examine them from all angles, and then decipher their architecture,” states Maier. “At the same time, we get fundamental insights into the workings of cells in which proteins process signals, synthesize substances, and transport molecules. Protein structures are one of the keys to understanding life,” says Maier with a twinkle in his eye. ■



Model protein complex
Structural model of the human mTOR complex I based on electron microscopy and crystallographic data. This protein complex controls cell growth, depending on hormonal signals and nutrient supply (image: 3D print, Biozentrum, Stefan Imseng).

Groundbreaking formula

Triestine mathematician rediscovered.

Economists rediscover a pioneering formula for option contracts by a mathematician from Trieste. A research project by two Basel economists has produced an unexpected result, with the rediscovery of a long-neglected work on option contracts by the Triestine mathematician Vinzenz Bronzin (1872–1970). Recently, this prompted the Italian city to name a square after him, not far from the stock exchange where futures and options were once traded. Professor Heinz Zimmermann of the University of Basel and the economic historian Wolfgang Hafner came across Bronzin's forgotten publication of 1908 while working on a research project and have produced a new edition of the text. The work, which is under 100 pages long, contains a consistent mathematical model for pricing option contracts, known today as options.

In his text, which remained unknown for a century, Bronzin arrived at a formula strikingly similar to the well-known Black-Scholes-Merton formula, which was developed only in the 1970s and later earned its authors the Nobel prize. Bronzin taught in Trieste, which was part of the Austro-Hungarian dual monarchy, as a professor at the imperial trade academy, where he also served as director for many years. However, he never mentioned his work on option contracts and did not publish anything else on mathematical finance. ■

Longitudinal study

Risk-taking propensity changes with age.

Although our propensity to take risks normally diminishes as we age, it is particularly susceptible to change in young adults up to the age of around 30 and in people aged 65 and over. A study involving psychologists from the University of Basel evaluated statements from more than 44,000 participants over a period of up to ten years and showed changes to individual risk-taking propensity in these phases of life. The researchers suggest that these early and late phases of life are particularly marked by individual cognitive and biological changes and influential events such as marriage or retirement that can influence individuals' risk-taking propensity.

Overall, women are less willing to take risks than men. Over a person's lifespan, the willingness to take risks particularly decreases in the areas of work and recreation. In contrast, risk-taking preferences in the social domain – such as the willingness to trust strangers – barely change with age. If a person becomes more open to experiences and more extroverted over time, their willingness to take risks will also increase – and vice versa. "Risk-taking propensity can be seen as a personality trait that is subject to change over the life course," says co-author Professor Rui Mata, Assistant Professor and head of the Center for Cognitive and Decision Sciences at the University of Basel. A further study has shown that, whatever a person's age, risk-taking propensity remains high in countries with widespread poverty and difficult living conditions, suggesting that environmental demands and affordances impact lifespan changes in risk-taking propensity. ■

Rui Mata is associate professor and head of the Department of Cognitive and Decision Sciences at Basel University's Faculty of Psychology.

Linguistics

Valentine versus Tchaikovsky.

Daria Dayter: Discursive Self in Microblogging. Speech acts, stories and self-praise. John Benjamins, 2016. 244 pp., EUR 95.

This book examines how users of the social networking site Twitter utilize linguistic tools in order to build a certain identity. The focus is on the speech acts of self-praise and complaint, and on the story-telling practices of microbloggers in the environment of ballet dancers. For three years, Daria Dayter at the University of Basel closely observed a group of eleven users who are united by their interest in ballet as a physical activity and an art form. In this time frame the researcher of the English seminar accumulated a corpus of 20,000 words of tweets, complemented by participant observation and a number of interviews. Tweets with contents such as complaints about listening to Swan Lake instead of having a date for Valentine's Day are shown to be much more than just pointless, narcissistic whining. With carefully selected, playful vocabulary, supported by strategically placed hashtag-application, the users turn a supposed grievance into a projection of a sophisticated, ballet-loving self that actually prefers Tchaikovsky's work to ordinary Valentine's dinners. These self-images are reinforced by analogous responses from the other members of the reviewed user-group who all have first or second degree connections with each other. The respondents show solidarity by endorsing the instigators self-image, while they simultaneously work on the projection of their own. They do this by utilizing Twitter's relatively decontextualized method of communication, answering in the same playful style and thereby both acknowledge and echo the salient theme: ballet. Daria Dayter investigates these linguistic techniques of identity-creation and solidarity-building in her research quantitatively as well as qualitatively. The study is located on the intersection of pragmatics, discourse analysis and conversation analysis. ■

Contemporary philosophy

Thinking about Emotion.

Rebekka Hufendiek: Embodied Emotions. A Naturalist Approach to a Normative Phenomenon. Routledge, 2016. 190 pp, 85 GBP.

Rebekka Hufendiek explores the concept of emotions. In her work "Embodied Emotions. A Naturalist Approach to a Normative Phenomenon", she rejects the common distinction between basic and higher emotion that differentiates between universally recognizable emotions (such as anger, fear or happiness) and emotions that need cultural or social context. Instead she puts forward a theory that classifies all emotions as embodied, action-oriented representations. The postdoctoral candidate at the University of Basel provides a non-cognitivist approach for thinking about human emotion. She focuses not only on the bodily reactions involved in emotions, but also on the environment within which emotions are embedded and on the social character of this environment; the development of particular emotion types as well as the unfolding of individual emotional episodes. Hufendieks research provides a critical review and evaluation of current empirical studies, mainly in psychophysiology and developmental psychology, which are relevant to discussions about whether emotions are embodied as well as socially embedded. Her action-oriented approach can account for the complex normative structures of emotions and shares the advantages of cognitivist accounts of emotions without adopting their problems. Rebekka Hufendiek has a profound interest in the philosophy of the mind and has already written several papers and reviews on embodiment, emotions and the vices and virtues of naturalist approaches to the mind. Embodied Emotions makes an original contribution to ongoing debates on the normative aspects of emotions and will be of interest to philosophers working on emotions, embodied cognition and situated cognition, as well as neuroscientists or psychologists who study emotions and are interested in placing their own work within a broader theoretical framework. ■

What is life sciences law?

Different areas of law work together in the field of life sciences to provide a framework that promotes the development and spread of new technologies, minimizes the risks associated with their use, and sets boundaries where necessary.

Text: Herbert Zech

Why do we need law? This is a question not just for lawyers but also for the public, which in Switzerland can make laws directly. At issue here is the function of law. Since Immanuel Kant, if not earlier, we have known that law is not to be confused with morality, and it was Charles de Montesquieu who said, "If it is not necessary to make a law, it is necessary not to make a law." Laws are there to intervene when society would not work without them. This also applies to the field of competition – the law steps in when markets are at risk of failing.

The Law Faculty at Basel University has a particular focus on the field of life sciences. Medicine, pharmacology and agricultural technology have one thing in common: They are increasingly using living organisms as tools, a development also known as biotechnology. The life sciences therefore deal with organisms both as subjects – human patients, animal patients and plants undergoing treatment – and as objects i.e. tools for human use.

The implications for the law are twofold. On the one hand, this is a matter for traditional technology law – law dealing with the development, application and consequences of technology, where technology is understood as the application of knowledge underpinned by science. On the other hand, life sciences law needs to set ethical boundaries for the treatment of people and animals. The Law Faculty is exploring both areas.

For technology lawyers such as myself, the role of life sciences law is to deal with the life sciences as an especially innovative and cutting-edge technology. It has several key functions in this regard. Life sciences law promotes innovation, facilitates technology transfer, regulates risks – by minimizing risks and setting admissible limits – and allocates the permitted risks by means of liability provisions.

Promoting innovation is traditionally the domain of intellectual property (IP for short). Through patent protection, in particular, it seeks to incentivize investment in the development

Herbert Zech
is Professor of Life Sciences Law and Intellectual Property Law at the University of Basel. His research focuses primarily on the use of intellectual property law to protect innovation, on liability for new technologies and on the treatment of biological resources in civil law.

of new technologies. The second function of intellectual property is to make knowledge tradeable. In addition, the law provides further necessary regulation in respect of technology transfer, especially contract law and antitrust law, which removes barriers to competition.

Risk regulation is the domain of public law. The traditional paradigm was that of danger defense, the aim of which was simply to prevent unacceptable risks, through legal prohibitions and licensing requirements. This has developed into a modern form of regulatory law that provides a wide range of incentives to permit and enable technological risk-taking, where the anticipated social benefit outweighs the harm, while ensuring that unnecessary risks are avoided.

A central concern in this regard is the assessment of the risks arising from new forms of technology, such as gene technology or nanotechnology. This is where the last function of the law comes into play – to allocate risks, where they are judged admissible, to their likely beneficiaries. Ensuring that risks and benefits are linked is not just a question of equity; well-drafted liability provisions also serve to encourage the developers and users of new forms of technology to minimize risk.

In this way, different areas of law are working together in the field of life sciences to establish a legal framework that promotes the development and spread of new technologies, minimizes the risks associated with their use, sets boundaries for their use where necessary, and imposes responsibilities for risks, including financial liability. Lawyers are involved in this process both as users and as advisers on the framing of legislation.

Fundamental questions such as whether and to what extent gene technology should be used need to be decided democratically, but the detailed drafting of legislation calls for specialist legal knowledge. That is where legal research comes in. It is dealing with a wide range of topical issues, from gene technology to stem cell research to new types of medication. Basel provides an ideal setting for this work. The Centre for Life Sciences Law at Basel University's Law Faculty is set to make an important contribution to research and teaching in the field. ■

"Legal research in life sciences is dealing with a wide range of topical issues, from gene technology to stem cell research to new types of medication."

Herbert Zech

The art of ethnography.

Text: Samuel Schlaefli Photo: Basile Bornand

Silvy Chakkalakal is studying the photographs and films of the American ethnologist Margaret Mead. Mead's fieldwork in Samoa and Bali was not simply academic research, but artistic practice.

Silvy Chakkalakal studied cultural anthropology and comparative literature in Tübingen, London, and Berlin, gaining her doctorate from Humboldt University in Berlin. Her doctoral thesis, entitled "Die Welt in Bildern (The world in images)", was published by Wallstein in 2014. She is a research fellow at the Center for Cultural Studies and European Ethnology and is currently studying the visual fieldwork of the American ethnologist Margaret Mead.

Silvy Chakkalakal's unadorned office in the old university on the Rheinsprung is enough to dispel any naïve exotic fantasies that readers of Claude Lévi-Strauss or Margaret Mead may have about the ethnologist's profession. There are no carved wooden masks, maps covered with handwritten notes, or research reports smelling of the tropics. On Chakkalakal's desk sits a large computer screen, together with a pile of lecture notes in ring binders, some thick tomes of recent vintage, and a smartphone.

The only adventurous touch is a small plastic figurine of an archetypal beauty from the TV series "Game of Thrones". "A gift from a student," Chakkalakal says. In one of her seminars, she explains, she and her students analyzed image practices in contemporary television series, looking at the use of mythical creatures, zombies, and vampires as cultural models and forms of commentary on political, racial, and class issues. The 37-year-old specializes in this sort of cultural decoding of images.

Childhood as a site of projection

It was Chakkalakal's curiosity, love of literature, and own experiences as the child of south Indian immigrants to Germany that first attracted her to cultural studies almost 20 years ago. "I have always been interested in making the familiar strange and turning the ethnological gaze on things we regard as mundane." Her interest soon turned to the subject that would provide a focus for her research over many years: childhood. "It is one of the last great sites of projection of our time. In the discourses around it, we find every imaginable social aspiration, vision, and idea," Chakkalakal explains.

Chakkalakal sees childhood as a purely cultural category that is deployed differently at different times and in different contexts in the pursuit of social agendas. Before long, she was carrying out her own fieldwork in the area. In interviews with parents from Berlin-Kreuzberg, she looked at the role of parenting practices in constructing the notion of the "foreign child".

In her PhD, she deepened her historical understanding of the subject. While combing through the archives of the Deutsches Museum in Munich, she happened to come across Friedrich J. Bertuch's "Bilderbuch für Kinder (Children's picture book)", an anthology of images for children that were popular across Germany between 1790 and 1830. These sought to explain the world to children using illustrations of the latest discoveries in botany, zoology, geography, and technology.

Chakkalakal set out to interpret the book from a sociological and historical perspective. She soon realized that the boom in children's publications of this kind at the beginning of the 19th century was ›

rooted in an emerging bourgeois view of childhood as a sensitive and formative period that determined one's success in later life. As she sums it up: "The future was made contingent on childhood as a result of people's desire to protect their own class interests."

Photos, films, poetry, and music

Chakkalakal's expertise in the interpretation of images has brought her from Berlin to Basel. A Swiss National Science Foundation joint project between the universities of Basel and Berne, involving cultural anthropologists and English specialists, is looking at the visual fieldwork of three celebrated American ethnologists. These scholars produced their ethnographies in the form not just of academic articles and books, but of photographs, films, poetry, and music. The project aims to discover how their artistic practice related to their practice as academics.

Chakkalakal is concentrating on the ethnologist Margaret Mead. Although millions of copies of her books sold in the 1930s and 1940s, exerting a powerful influence on subsequent generations of ethnologists, little research has been done up till now into her fieldwork using visual media. Chakkalakal has made two trips to Washington to look for pictures and films in the Mead archive in the Library of Congress, uncovering a vast amount of material. In Bali alone, Mead and her husband Gregory Bateson took more 25,000 photos and shot 500 rolls of film during the 1930s. Chakkalakal has started to place this material within its historical context, a time when interest in other cultures was increasing sharply and ethnology was focused on preservation. Researchers were constantly filming, taking photographs, and making notes, as they suspected that this was the last opportunity to capture indigenous cultures threatened by extinction.

"We have to get more involved in public debate again and use our knowledge."

Silvy Chakkalakal

Interventionist anthropology

Mead also provides the inspiration for Chakkalakal's own work. Throughout her life, the American ethnologist was involved in public discussions and fought against racism, eurocentrism, and traditional role models. "Today, too, cultural anthropologists often work on highly topical social questions that are discussed every day in the media. We must use our knowledge to intervene more actively in public debates," Chakkalakal is convinced. She cites the example of the sexual assaults in Cologne and how they have been linked to recurrent racial stereotypes.

Recently, Chakkalakal has discovered museum work as a way of making her research accessible to a wider public. With the Johann Jacobs Museum in Zurich, she is currently cooperating on two exhibitions on the cross-fertilization between art and ethnology. Before then, she will be making two lengthy research trips to the USA to rummage through the archives and immerse herself once again in the world of Margaret Mead. ■

AlumniBasel Graduate Portrait

Harmonizing yeast cells with Seneca.

Dates for upcoming concerts:

September 25, 2016, as part of the Arlesheim Chamber Music Society concert series

November 2, 2016, Haus zum Lindengarten, Zürich

Those attending AlumniBasel's 10th anniversary celebrations at the Wildt'sches Haus were wowed by the piano performances of two alumni, Beate Westenberg and Beat Schönegg. Both studied and completed their PhDs in Basel, she at the Institute of Plant Physiology and he at the Department of Classics.

Last fall, when the admin team at AlumniBasel were asked to come up with a music program for the organization's anniversary celebrations, they did not have far to look. The university's former students include many interesting alumni, with a wide array of talents. Among them are two pianists, who were able to offer those present at the event a quite unique musical experience.

Beate Westenberg was only 17 when she played her first concerts, performing Ludwig van Beethoven's challenging first and second piano concertos. Even while still at school, she was fascinated by biology as well as music, so after graduating from high school in Muttenz she embarked on a biology degree. Following research carried out at the Biozentrum, with Professor Eduard Kellenberger and Professor Howard Riezman and as at the Institute for Plant Physiology, she successfully completed a dissertation on "The Function of the Vacuole in Saccharomyces cerevisiae" in 1991 under the supervision of Professor Thomas Boller and Professor Andres Wiemken. At the same time as doing research at Basel University, Beate Westenberg was also finishing off her piano studies with Huguette Bolle in Basel and Geneva.

Today, in the era of the credit point system, it would probably be impossible to study two subjects in that way, but it is worth noting that this combination of musical and scientific talents is not unusual. A prominent example at Basel University was Professor Gottfried Schatz, who taught at the Biozentrum and passed away in October 2015. Not only was Professor Schatz an outstanding researcher, teacher, and essayist, he was also a superb violinist. The current university orchestra includes quite a number of students who have mastered a classical instrument and are able to play demanding orchestral pieces. Beate Westenberg still recalls fondly that at the Biozentrum, in particular, small groups would meet together to play music, and to an extremely high standard.

Beat Schönegg was born in Basel in 1967 and began to compose his first short pieces at the tender age of seven. After graduating from high school in Oberwil, he decided to study classics and ancient history at the University of Basel, where he was taught by Professor Fritz Graf and Professor Jürgen von Ungern-Sternberg. While working on his degree, he continued to train as a musician, studying piano with Peter Efler and composition with Balz Trümpy. He completed his university studies with a dissertation on the Roman philosopher Seneca. His intensive engagement with Seneca later formed the basis for a novel, "Der Tod des Seneca (The Death of Seneca)", published in Stuttgart by Reclam in 2001. Beat Schönegg has just published a novella entitled "Busoni in Bad Bottmingen", which is woven around the piano virtuoso Ferruccio Busoni and his stay at Bottmingen Castle around 1910.

Beate Westenberg and Beat Schönegg first met at a lecture on music theory and quickly struck up an artistic partnership. They had the idea of forming a piano duo, as it would allow them to play chamber music for soloists together. The Schönegg-Westenberg piano duo have been giving concerts regularly since 2006. They play not only well-known duo pieces, but also some rarely performed works, as they are always hunting through libraries for forgotten treasures. They are especially concerned to place their discoveries in historical context and to play them as they would have been performed at the time – this is where their research background comes through. Beate Westenberg and Beat Schönegg have been members of AlumniBasel for many years. They saw their concert at the Wildt'sches Haus as a good opportunity to thank "their" alma mater and to give something back. ■

2pianos.ch

AlumniMedizin

Schifferli appointed new manager.

At the end of 2015, Professor Michael Mihatsch handed over the AlumniMedizin reins after almost 20 years to Professor Jürg Schifferli.

ALUMNI BASEL: What motivated you to take on this honorary position alongside your many other activities?

JÜRG SCHIFFERLI: The honor! Of course, it must also be fun to bring together so many highly qualified people. If our alumni see how the faculty is developing, the excellent teaching it offers, and the outstanding research it performs, then they will support us. After all, our early career researchers deserve it.

ALUMNI BASEL: As the new manager of AlumniMedizin, where will you be copying your predecessor and where will you be taking a new approach?

JÜRG SCHIFFERLI: Michael Mihatsch built up AlumniMedizin, organized fantastic events, presented an alumni award, and much more. He is an artist, as pathologists often are. He has created a connection between the faculty and the city. However, this connection, this method of attracting alumni, is a difficult task. It will be important to expand alumni membership, for example by addressing year groups after the state examinations. Meeting up with all your old colleagues again is great fun.

ALUMNI BASEL: What is the most important contribution that alumni can make to the university?

JÜRG SCHIFFERLI: Actually, it's the other way around: The university must show how it helps our society to develop. Then the alumni will support it – whether they are members or not. Without the university and without the support of the many alumni in our society, Basel – and Switzerland as a whole – would lose its identity. We are leaders, but only because we have top higher education institutions and continue to develop them – alumni are key ambassadors here. ■

Jürg Schifferli
Professor Schifferli has studied and researched medicine (internal medicine, nephrology, and immunology) in Neuchâtel, Geneva, and London. From 1993 to 2014, he was Professor and Head of the Department of Internal Medicine in Basel. From 2003 to 2012, he served as Director of the Department of Medicine and Board Member at University Hospital Basel and was a member of the National Research Council of the SNSF (2000–2009).

Additional Benefits

Akademis – a new member offer.

AlumniBasel is careful to offer only selected benefits of lasting value to members. Since 2005, we have been working with the Benefit Foundation to offer seminars on retirement and financial planning, which have proven very popular. In recent years, people have become much more aware of the importance of retirement and financial planning. We have seen this reflected in take-up for our seminars, which are always fully booked, and in rising demand for our personal advice service.

It is therefore natural that we should want to extend our provision in this area. Since December 2015, members of AlumniBasel have been able to use the insurance and financial services platform Akademis free of charge. Akademis offers a varied and ever-improving portfolio of insurance and financial solutions designed specifically for graduates. Users can take advantage of attractive discounts and request an individual needs analysis, all from the comfort of their own home, via their computer.

This is how it works: Once you have registered as a member of AlumniBasel, you can access the whole package. For instance, you can create your own investor profile, which assesses your capacity for investment risk, or you can have an individual needs analysis carried out. This provides you with personalized advice identifying the insurance and financial solutions you require, those that are inappropriate, and those that need to be tailored to your own situation, along with suitable products and discounts.

Graduates and university-educated people have particular needs because they are more mobile (they may have spent time abroad, for example) and because generally they start making social insurance contributions a bit later. Akademis specializes in precisely this area, offering customized solutions. The offer of free access to its platform is restricted to members of AlumniBasel and employees of Basel University.

AlumniBasel continues to offer member discounts on various newspapers and insurance policies, as well as deals on certain computers, books, and our exclusive wine from Cyprus. And there is much more besides, including access to the high-quality and diverse range of courses offered by the university language center. ■

akademis.ch

Alumni in Business

Vladimir Cmiljanovic, CEO of Piqur.

Vladimir Cmiljanovic
CEO and founder of the spin-off Piqur.

Last year, the pharmaceutical company Piqur, a spin-off from research at Basel University, announced that it had successfully completed the first clinical trial of a potential treatment for cancer. Piqur's CEO, Dr Vladimir Cmiljanovic, is a graduate of the University of Basel.

When Vladimir Cmiljanovic fled to Germany during the Yugoslav war, it was as a professional handball player with 100 Swiss francs in his pocket. His first port of call was the handball club in Bielefeld. By a roundabout route, and with the active support and patronage of Dr Ernst Schneider, the head of the Basel firm Davidoff, the talented young Serb was able to graduate from high school and then study chemistry at the University of Basel. His academic mentors were his PhD supervisor Professor Bernd Giese, at the Institute of Organic Chemistry, and Professor Matthias Wymann, at the Department of Biochemistry.

However, Piqur owes its existence as a company to the many talents of Vladimir Cmiljanovic. For instance, it was he who managed to get Bernd Giese and Matthias Wymann on board with his interdisciplinary project, leading to the establishment of Piqur in 2011. Since then, the start-up business with its 18-strong workforce has been able to mobilize investment in the tens of millions. In 2014 Vladimir Cmiljanovic won the Northwest Switzerland Young Entrepreneurs Award with Piqur, while in 2015 he scooped the prestigious SEF Award.

In last year's trial involving 28 patients, a drug called PQR309 was tested on humans for the first time as a treatment for advanced solid tumors, with promising results. The effectiveness of PQR309 is currently being tested in several phase 2 trials, involving both solid tumors and lymphomas. The drug is a new kind of inhibitor, developed for oral administration, and opens up new possibilities for the treatment of malignant oncological and hematological brain diseases. Back when he was a young handball pro on the run, Vladimir Cmiljanovic could hardly have dreamt of such success – and he will never forget how his alma mater helped to turn his dream into a reality. ■

piqur.com

Alexander Honold is a literary scholar specializing in narrative research and modernist and contemporary literature. His book "Einsatz der Dichtung. Literatur im Zeichen des Ersten Weltkriegs (Writing in action. Literature against the backdrop of the First World War)", Berlin 2015, was published recently. Photo: Andreas Zimmermann.

Alexander Honold

The Aesthetics of Resistance – Peter Weiss's epic of resistance, flight, and bearing witness.

"The work is an attempt to take seriously from a literary standpoint the Marxian dictum that history is the product of class struggles."

Blocks of text that look to have been hewn from stone: Peter Weiss's "The Aesthetics of Resistance". Three volumes, published between 1972 and 1981, encompassing a decade's worth of writing and the events of half a century. I first discovered this trilogy of novels – in a one-volume Suhrkamp edition nearly 1,000 pages long – in 1983, before starting my degree, and ever since I have been struck by the power of its opening passages. "A gigantic wrestling, emerging from the gray wall, recalling a perfection, sinking back into formlessness." The reference is the "Gigantomachy" depicted on the Pergamon frieze in Berlin, in which the Olympian gods assert their authority by force against a race of earthly rebels. The tumult of battle chiseled into the marble is brought vividly to life by the author's mastery of description. We look at this stone sea of grappling bodies through the eyes of three young resistance fighters, who are engaged in secret underground operations in Hitler's Germany in 1937. As they painstakingly examine and decode the details of the frieze, they come to see the unwieldiness of art – something that also makes considerable demands on the novel's readers, it must be said.

In fact, the work is an attempt to take seriously from a literary standpoint the Marxian dictum that history is the product of class struggles, and to translate it into a narrative project. When barely 20 years old, Weiss himself had escaped persecution by fleeing first to England and then to Sweden. From the detachment of exile, he was a skeptical observer of the culture of suppression of the past in West Germany. The centenary of his birth on November 8, 1916, in Babelsberg, near Berlin, is a distressing reminder that such eyewitness testimony will soon be a thing of the past.

The only survivors still around today to describe their personal experiences of flight from Nazi terror and German antisemitism are 80 years old or more; before long, their voices will fall silent. A reprint of "The Aesthetics of Resistance" is in press. Peter Weiss's most important work is about to be rediscovered. ■

unibas.ch/aktuell

A selection of events. May – October 2016

May 10, 6.15 pm

Hegel's Habits, Principles and Principles Habits

Lecture by Professor Andreja Novakovic, Department of Philosophy, University of California, Riverside.
University Kollegienhaus, Regenzzimmer 111, 1st floor, Petersplatz 1, Basel

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May 18, 6.15 pm

You Can't Always Get What You Want: How Will Law Enforcement Get What it Needs in a Post-Encryption Era?

Lecture by Stephanie Pell, Assistant Professor and Cyber Ethics Fellow at West Point's Army Cyber Institute (ACI) and Affiliate Scholar at the Center for Internet and Society at Stanford Law School, Stanford, USA.
Pro Iure Auditorium, EG.44, Jacob Burckhardt Haus, Peter Merian-Weg 8, Basel

May 24, 6.15 pm

Extrastatecraft

Lecture by Keller Easterling, Yale School of Architecture.
eikones Forum, Rheinsprung 11, Basel

May 25, 6.15 pm

From Institutional Critique to Institution Making – Contemporary Art Beyond the Artworld

In face of a globalized art world, the question of the place, form and medium of institutional critique has acquired new relevance. Lecture by Dr Emily Eliza Scott, ETH Zürich.
Department of Art History, great lecture hall, Laurenz-Building, St. Alban-Graben 8, Basel

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May 27, 3.15 pm

Economic inequality from statistical physics point of view

Lecture by professor Victor Yakovenko, University of Maryland Department of Physics, lecture hall 1, St. Johanns-Ring 25, Basel

May 30, 6.15 pm

Speculation and Spectacle: Oil and Modernization in Kuwait

This lecture series asks prominent contemporary scholars to illuminate the history of interventions that have attempted to reimagine the modern city. Michael Kubo, PhD, Massachusetts Institute of Technology, School of Architecture + Planning, focuses on the changes Kuwait has undergone.
eikones Forum, Rheinsprung 11, Basel

June 1, 4.30 pm

Shaping up Membrane Proteins

Lecture by Dirk Schneider, Johannes Gutenberg University Mainz.
Department of Chemistry, lecture hall 4.04, Klingelbergstrasse 80, Basel

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July 1–2

Swiss Open Cultural Data Hackathon

Developers, artists, researchers, and members of the heritage sector gather to re-use open data sets. Come and experience the Hackathon!
University Library, Schönbeinstrasse 18-20, Basel

September 20, 6.00 pm

What is life? A journey from single molecules to synthetic cells

Lecture by professor Cees Dekker, Delft University of Technology.
The SeminBar, organized by the NCCR Molecular Systems Engineering, brings new know-how on molecular systems engineering to researchers and the interested public alike. The lectures are in English and are followed around 9 pm by an after-party organised by and for students.
Ackermannshof, St. Johanns-Vorstadt 21, Basel

October 27, 7.20 pm

Basar Molekular

This live talk stimulates an interdisciplinary discourse between scientists and society. Guest: Andrea Schenker-Wicki, rector of the University of Basel. More guests to be announced online.
Sud, Burgweg 7, Basel

FONDATION **BEYELER**
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Peter Fischli David Weiss, *Rat and Bear (Sleeping)*, 2008, Installationsansicht: Time Crevasse, Yokohama International Triennale of Contemporary Art, 2008, Wolle, Stoff und Elektromotor, 2 Teile: 82 × 37 × 27 cm, 88 × 48 cm, Museo Nacional Centro de Arte Reina Sofía, Madrid © Peter Fischli David Weiss, Foto: Jason Klimatsas/Fischli Weiss Archiv, Zürich

Alexander Calder *& Fischli Weiss*

www.fondationbeyeler.ch