

Portal **Wissen**

The Research Magazine of the University of Potsdam

Two 2020



HEALTH



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HEALTH!

The Coronavirus pandemic has made it very clear how much health and well-being determine our lives.

And that science led the way in this regard could not be ignored. At the University of Potsdam, too, many researchers deal with aspects of health maintenance, whether in nutritional sciences, sports and rehabilitation medicine, biochemistry, or psychology. Their research includes supporting chronically ill children and the professional handling of risks, as you can read in this issue of our magazine.

With the establishment of our seventh faculty, the Faculty of Health Sciences, these and many new medical topics are getting more attention at the University of Potsdam. While in the beginning, the "Brandenburg Health Campus" funded by the federal state of Brandenburg was a virtual

network of university and non-university research, it is now getting more points of intersection and, not only since COVID-19, a very practical use and plausible to everyone.

The Faculty of Health Sciences, founded in 2018, is supported by three institutions: the University of Potsdam, the Brandenburg Technical University Cottbus-Senftenberg and the Brandenburg Medical School in Neuruppin. They pursue an interdisciplinary approach that holistically develops teaching, transfers new scientific findings from theory to practice and thus further improves overall medical care in Brandenburg. Their vision of being a central platform of research, teaching, and transfer combines socially relevant issues and existing expertise to align them with the needs of people in

Brandenburg and use them to their benefit. This interdisciplinary structure has never been more important to advancing patient-oriented basic research and health care models. An innovative concept that can make Brandenburg a pioneer.

In the meantime, the Faculty of Health Sciences has established 16 new professorships at the supporting universities, which are concerned with medicine and healthy aging, health services research, nursing and rehabilitation sciences, and telemedicine. Cardiology and physiology will play a central role as well. In general, the innovative faculty counts on strong interdisciplinary relationships, for example with nutritional sciences and the digital health department at the Digital Engineering Faculty. The role of digitization and well-prepared data in

combating the Coronavirus pandemic can also be read about in this issue.

As usual, the research magazine addresses the full range of research at the university: We introduce historian Dominik Geppert, who deals with the history of unified Germany after 1990 embedded in the tensions created by a context of national unification, European integration, and global networking. In a self-experiment, we explored together with a psycholinguist how to research word-finding disorders. Last but not least, we were able to take part in a trip to Namibia, where ecologists from Potsdam examine wildlife management in the threatened savannah. Let them take you where kudu and springbok live!

DR. SILKE ENGEL
TRANSLATION:
SUSANNE VOIGT



EXERCISE DOESN'T MAKE EVERYONE FEEL GOOD

A psychologist and a medical researcher speak about habits, common sense, and motivation

Is exercise healthy? What a question! Everyone knows this, and yet many people find it difficult to exercise regularly, to get their circulation going, and to work their muscles. This would not only reduce obesity, the risk of illness and health problems, but also depressive moods and stress-related disorders. "Portal Wissen" asked rehabilitation expert and cardiologist Prof. Dr. med. Heinz Völler and sport and exercise psychologist Prof. Dr. Ralf Brand for professional advice.



How do you explain the paradox that people exercise too little against their own better knowledge and thus put their health at risk? Or let me put it like this: Why do they act against their own body?

Völler: It only seems like a contradiction. People who lack exercise have their own role models who reached old age even without physical activity. In addition, they

have a different body awareness or understanding and do not feel the need that they must or should exercise. On the one hand, disposition, i.e. hereditary factors, plays a role, on the other the social environment has a great influence. Those who have never learned to exercise and do not know anyone in their immediate surroundings who exercises will not miss it.



THE RESEARCHERS

Prof. Dr. Ralf Brand has received university diplomas in psychology and physical education. He is Professor of Sport and Exercise Psychology at the University of Potsdam and Affiliate Professor at the Department of Kinesiology at Iowa State University (USA).

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Prof. Dr. med. Heinz Völler is a specialist of internal medicine, cardiology, and social medicine. He is Professor of Rehabilitation Medicine at the Faculty of Health Sciences of the University of Potsdam, the Brandenburg Medical School Theodor Fontane (MHB), and the Brandenburg University of Technology Cottbus-Senftenberg. He is Medical Director of the rehabilitation center "Klinik am See" in Rüdersdorf.

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known and frequently occurring cardiovascular diseases, a change in behavior seems to be comparatively difficult. How can we increase motivation here?

Brand: This is not only true for exercise but also in many other situations. We often know that we behave irrationally but do it anyway. People follow their habits and in particular organize their leisure time so that it is comfortable. And this is exactly where the problems with exercising begin: First of all, exercising takes time – time that I liked to use for something else in my old life without exercise. And now I am supposed to take this time for something that will make me run out of breath, and do this regularly? People who exercise regularly and extensively have learned – through many repetitions – that enduring the exertion of jogging will be worth it in some way. People have to get over the erroneous assumption that exercise is only “worthwhile” when it is exhausting. The only way to start a healthier life is to find the physical activity on which you don't mind spending some time. Training and exertion can come later and, in fact, often come automatically without having to force yourself.

During the pandemic we are currently forced to protect ourselves from a largely unknown disease by changing our behavior accordingly. To prevent well-

Brand: Many people in Germany seem to have behaved very reasonably for some time and willingly adapted their behavior during COVID-19. From my point of view, this has something to do with the urgency of the behavioral change that we saw every day, for example on TV. The news coverage made it very clear that not only could the virus theoretically affect anyone, but that you yourself could be next tomorrow and you can effectively adjust your behavior tomorrow. When it comes to preventive health care through physical activity and exercise, we are dealing with another dimension in terms of time. Imagine a 30-year-old person: if he or she regularly exercises twice or three times a week now, he or she may not have a heart attack in 20 years. Does that prompt you to take immediate action in the same way? You have to approach the promotion of exercise and physical activity differently, in a psychologically more subtle way. The students at the Department of Sports and Health Sciences in Potsdam learn a lot about what can be done to help people motivating themselves for exercise, for example that it is more valuable to help them experience exercising than to talk about the potential positive effects.



Völler: During the lockdown everyone could move freely. Hiking, jogging, and cycling were possible and many people who enjoy exercise practiced it. An equally large proportion of the population probably perceived the lockdown as a restriction of freedom of movement or even happily accepted this. I doubt whether the latter see the connection between the higher risk the SARS-CoV-2 virus poses in the presence of cardiovascular diseases or risk factors such as high blood pressure. I don't think that this connection is recognized by many people or increases their motivation to be physically active.

Brand: Of course it is unrealistic, but if there were campaigns for physical activity and exercise as insistent as for the protection against corona, we would certainly also see changes in this area – at least for a while. After all, the difficult motivational situation remains: The campaign wants you to do something you don't really want to do, but which will eventually makes it less likely for health problems to develop in the future. However, people believe that they need to rest now because the next day will be hard enough. It is usually not enough to hope for the rationality of people.

Many diseases, especially of the musculoskeletal and cardiovascular system

EXERCISE DURING THE PANDEMIC

Together with colleagues from around the world, Prof. Ralf Brand conducted a large-scale study on the effects of the pandemic-related lockdown on exercise behavior and subjective well-being. They collected data from more than 16,000 participants in 32 countries; an article with results from the study has been submitted for peer review to an international research journal. "The data show that those who had been regularly active before Covid-19 remained as active during the lockdown as they had been before or even increased their activity levels," Brand says. "Many of those who had been going to gyms before went jogging during this time or created exercise opportunities at home. It is interesting that many of those who had never or rarely exercised before the lockdown became more active during the crisis." The researchers also found differences in the effects of exercise behavior change during Covid-19: Adoption of exercise for those who were inactive or rarely active before the lockdown did not lead to positive changes in mood. If you had been sufficiently active before the crisis, this was, in some way, a protective factor for a relatively good mood during the crisis.

but also of the mind, are treated with the help of exercise. What effects do you see in patients?

Völler: Especially in people with said diseases, the benefit of regular exercise is greater than in healthy people.

Brand: There are now very impressive findings on the importance of exercise in treating depressive disorders. Early works on this subject were often methodologically weak and findings were unconvincing.

REHABILITATION DURING THE PANDEMIC

Prof. Dr. med. Heinz Völler is Professor of Rehabilitation Medicine at the Faculty of Health Sciences and also Medical Director of “Klinik am See”, a rehabilitation center for internal medicine in Rüdersdorf. In the Covid-19 pandemic, he constantly faces the challenge of offering patients and employees the greatest possible level of protection. Patients who come directly from the hospital must show a negative smear test. Those who were at home after a hospital stay have to keep a symptom diary for a week. “If a SARS-CoV-2 infection is suspected, a smear test is carried out on site and the patient has to stay in quarantine until the result is available,” Völler describes the tightened admission procedure. The employees also keep a symptom diary, receive regular smear tests, and are exempted from work. Group sizes were reduced and meal times changed to comply with social distance rules. In addition, the already high hygiene standards were intensified. “So far there have been no infections, so that the risk group of patients with cardiac diseases could undergo regular rehabilitation,” Völler says.

This has changed over the past ten years, and it has become clear that therapy results improve if exercise is involved.

People who started exercising after a long period of inactivity or in medical rehab not only report positive physical effects but also an improved level of well-being. Relapsing into old habits is nevertheless quite common. What is the reason and how can you counteract it?

Völler: The effects of an active lifestyle are manifold. In addition to better fitness, there is also improved immunity and a more stable mood. However, if people do not get permanent support, depending on their social environment they often fall back into familiar behavioral patterns. Therefore, schools and companies must pay more attention to a healthy lifestyle. In addition to exercise, nutrition also plays a major role. School and company-facilitated sports should be an integral part of everyday life.

Brand: But as a sports fan and exercise promoter you also have to be careful not to fall into the trap of pretending that exercise makes you feel good immediately! This is not the case. When an untrained and a trained person go running together, only one of them will feel good at a faster pace. It's about finding the kind of physical activity that is perfect for you. You can even get help: There are experts at every school, every health center and certainly also at many gyms who know how to offer sport and exercise in a way that is enjoyable and fun.

ANTJE HORN-CONRAD
TRANSLATION: SUSANNE VOIGT





FIGHTING PATHOGENS

Chemist Matthias Hartlieb develops substances that could replace antibiotics in the future

Since April 2019, Dr. Matthias Hartlieb has been a postdoc research fellow in the Open Topic Initiative of the University of Potsdam. His research focuses on antimicrobial polymers, i.e. chemical substances that destroy microorganisms such as bacteria and are in particularly high demand in the health sector. Against the backdrop of the corona virus, his research has gained special relevance, even though it focuses on bacterial pathogens. For years, the medical field has examined the question of how sick and immunodeficient people can be protected from germs. Dr. Jana Scholz spoke to the chemist about resistant bacteria, the effectiveness of antibiotics, and the fragility of the health care system.

Dr. Hartlieb, how long have you been researching antimicrobial substances and why?

I first came across antimicrobial polymers shortly after completing my doctorate. From 2015 to 2017 I was in England, in Prof. Sébastien Perrier's group in Warwick. Various ideas for antimicrobial materials such as peptides, polymers, and combinations of these classes of substances developed during the work with him. Of course, the topic was not new at the time and various groups have been working on it for 15 years already. We, however, asked ourselves new questions – for example how the microstructure of polymers influences antimicrobial properties.

The topic captivated me because it addressed an important problem: antimicrobial resistance. The growing resistance of bacteria to normal antibiotics is becoming increasingly problematic and the World

Health Organization (WHO) has placed this at the top of its list, the keyword here being “hospital germs”. We are experiencing firsthand what happens when there is a pathogen for which there is no antidote. Bacteria, of course, would not spread as rapidly as the Corona virus is currently doing. It is more about hospital environments and people who have a weak immune system, for example elderly people and patients undergoing chemotherapy, suffering from autoimmune diseases or having transplants. At the moment, there is almost always an antibiotic that helps. But if resistance genes continue to spread, the end of the flagpole could soon be reached. In such a “post antibiotic era”, medical procedures would be significantly more dangerous and life expectancy could decrease considerably.

Working on antimicrobial polymers is my contribution to doing something useful for our society. It remains to be seen whether this will work – but we should at least try. That's why I took the topic with me to set up a junior research group.



THE RESEARCHER

Dr. Matthias Hartlieb studied chemistry at Friedrich Schiller University Jena. Since 2019, he has been a postdoc research fellow in Prof. Alexander Böker's group at the University of Potsdam.

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What substances are you working on specifically – what can they do and how do they work?

We manufacture water-soluble polymers that attack and destroy bacteria. The model for this are antimicrobial peptides, which our immune system uses to fend off bacteria. The detection works via electrostatic interactions, i.e. via charges. Bacteria are negatively charged, the peptides or our polymers are positive charged and thus attach to bacteria. Since the cells of our body are largely neutral, they are spared.

When the peptide or polymer reaches the bacterium, it disrupts its membrane structure and partially dissolves the membrane, which is fatal to the bacteri-

um. This is a great advantage over conventional antibiotics because the bacterium is hardly able to develop a resistance to this. In principle, that would be possible but the bacterium would have to sacrifice a lot for this, which in turn would reduce its pathogenicity. However, the polymers are not a miracle weapon because they are nowhere near as potent as antibiotics and the selectivity between bacteria and our own cells is often not high enough. That is where our research begins.

Where could these polymers be used?

The goal would be to use them like normal antibiotics, i.e. in the form of a pill or an injection, to fight an infection. The problem is that even if you find a polymer that has all the necessary properties, there are still lengthy approval processes that are also expensive. For this, these materials have to be made significantly better – which is my express goal.



Dr. Matthias Hartlieb at the lab



In the meantime, one could think about applications with a lower threshold, for example surface coatings that actively defend themselves against bacterial growth. This is important for implants but also for many medical devices such as catheters, accesses, etc. Antimicrobial polymers could also play a role in wound management. Of course, the materials would then have to be adapted to the specific purpose.

We are not currently working on these applications, but I have various ideas and will also submit research proposals on these topics.

What is the relevance of your research with regard to the Corona virus that, according to the latest information, can apparently survive on plastic surfaces for several days?

There are antimicrobial peptides that are also effective against certain viruses, but I have to admit that I don't understand enough about viruses at the moment to be able to say whether polymers could do it and how useful this would be in the end. I will be reading about this over the next few weeks while working from home.

What the current crisis shows us is the fragility of our health and how many vulnerable people we have in our society. Even after we have overcome this virus, such situations can occur again. In comparison, antimicrobial resistance is a rather slow process, but so far it can hardly be stopped and thus has an enormous potential to negatively impact our lives.

Which advantages and disadvantages do antimicrobial polymers have, for example with regard to allergies and resistances that might develop due to germicidal substances? Are these aspects also conceivable for the polymers you are working with?

Allergies and intolerances are always a potential risk, of course, but that is also true for conventional antibiotics. For me this is not a knock-out argument. Ideally, I will be able to say more about that in a few years.

The great advantage of polymers is that there is hardly any risk that bacteria will become resistant to them. We can also quickly and specifically change the structure and composition of the systems. The main disadvantage at the moment is the lack of selectivity. In other words, the polymers are too toxic for us. It is also not completely clear how exactly different polymers interact with the membranes, and which structural features are changed in which way. I hope to find answers to these questions.



You have your post doc position with the group of Prof. Böker in the Open Topic Initiative of the University of Potsdam. How have you found your new post and the research opportunities in Potsdam?

I've been here for almost a year now and I am very happy with the postdoc program. I enjoy so much freedom in my research. Prof. Böker is the ideal mentor who offers advice and assists and supports me wherever he can. He also gives me a lot of freedom in terms of the thematic structure of my work and lets me publish on my own. There is nothing left to be desired for a young scientist.

My biggest problem right now is staff. Various applications for the funding of doctoral positions or other human resources have already been submitted and more will follow. In the meantime, various topics for Bachelor or Master theses are available. So, if you have a background in chemistry or biochemistry and are looking for a topic for your thesis, feel free to contact me.

DR. JANA SCHOLZ

TRANSLATION: SUSANNE VOIGT



Good *News*

How data science helps us to better understand the Coronavirus pandemic





The pandemic caused by the Coronavirus starting back in late 2019 still affects the lives of billions of people around the globe even half a year later. In this situation, real fears of infection with the virus are just as crucial as deliberately disseminated misinformation. In order to be able to obtain independent information, publicly available data are important in fighting the virus. A group of researchers at the Hasso Plattner Institute (HPI) of the University of Potsdam is helping with this by providing findings and IT tools for graphical evaluation free of charge <https://we.analyzegenomes.com/>.

Who would have thought a few months ago that our everyday life would have been turned upside down by spring 2020? Whether social distancing rules in everyday life, wearing face masks while shopping, or

emergency on-site operations at universities – all of this has been triggered by the COVID-19 pandemic. Despite the restrictions, researchers at the HPI are working on collecting up-to-date data on the worldwide spread of the coronavirus and making it available to the public.

For many Germans, the restrictions due to the pandemic came abruptly and became tangible once kindergartens and schools were closed and contact restrictions came into force in March 2020. Until then, news coverage had primarily been limited to a distant epidemic in China. Even the prestigious Robert Koch Institute had only occasionally updated the global number of cases on its website. At the beginning of 2020, people were still amazed at the unabated zeal of the Chinese, who practically built entire emergency hospitals within only a few days.





The key to success: access to latest data

The HPI has already gained experience in researching epidemics. For example, HPI researchers worked with scientists from around the world to contain the 2014 Ebola epidemic in West Africa. At that time, contact tracing proved to be a very important measure. Contacts of infected persons were isolated during the incubation period and asked daily for disease-specific symptoms. The risk of infecting other people could only be reduced by rigorously identifying contact persons and isolating them.

Contact tracing is also a key to success during the current COVID-19 pandemic. With the first cases in Germany, infected people were traced and interviewed to identify contacts persons in the preceding days. The more consistent the tracing was, the sooner it became clear that it requires many human resources to be effective. The Ebola epidemic in 2014 had already shown that there can quickly be a shortage of qualified personnel for contact tracing. Therefore, the HPI developed an app for contact tracing together with an international team of researchers and tested it on-site in Nigeria. With this app and a brief introduction, even non-healthcare personnel were able to support the contact tracing. Recently, the HPI was also involved in the development of the so-called CovApp,

which supports the recording of relevant symptoms in suspected cases in Germany. Particularly in times of scarce resources in the healthcare system, the use of such digital solutions demonstrates how they can be used more effectively to enable medical professionals to focus on emergencies.

In addition to data from contact tracing another important data source is treatment data from hospitals. It contains, for example, details about the number of new, recovered, and deceased cases. However, these figures are collected locally and are only available in distributed, heterogeneous clinical IT systems. So far, no central register exists that automatically records the data without delay. Data that are collected nationwide, however, form the basis of many important decisions. For example, epidemiologists use current data on infected people in each region to assess the spread and recommend appropriate actions. The latest pandemic data can also provide information on the effectiveness of large-scale measures, such as the closing of restaurants.

Automatic integration of latest data

The HPI recognized the seriousness of the situation early on and started to identify available internation-

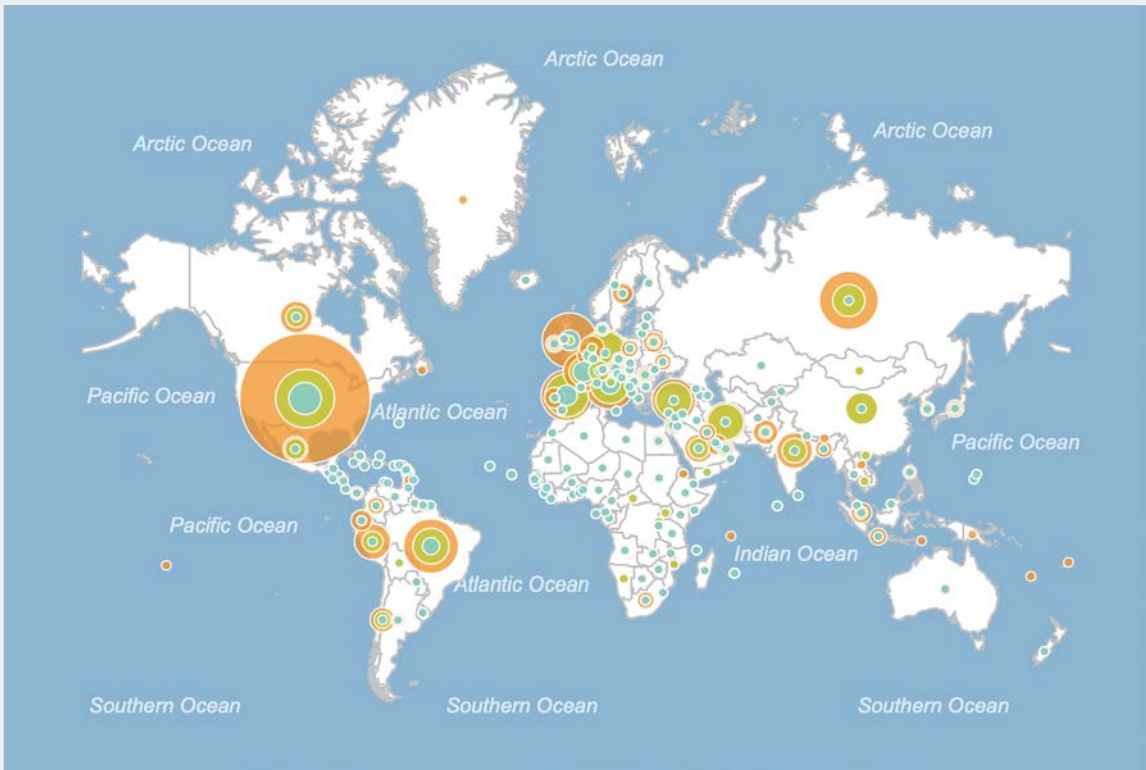
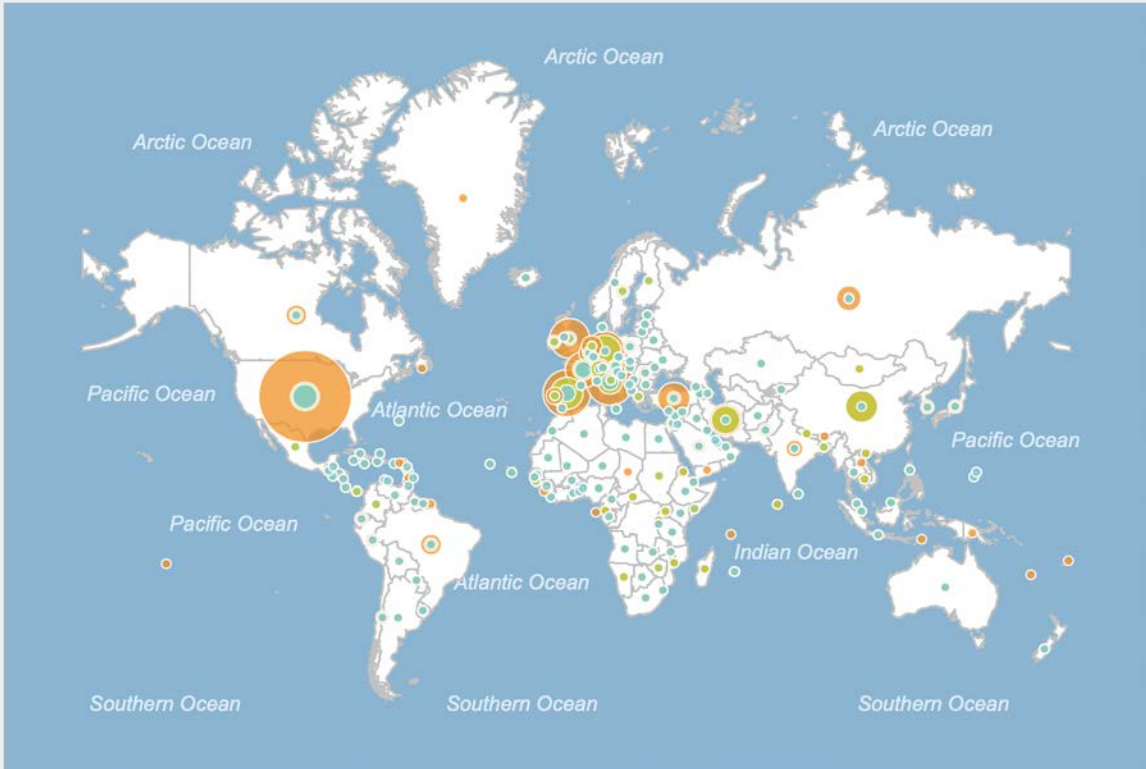
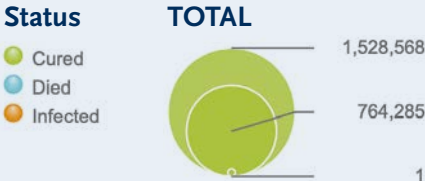


Fig. 1: Visualization of the number of COVID-19 cases worldwide on a world map, top April 20, bottom May 20. The pie charts show the absolute numbers per country.



Quelle: **HPI Hasso Plattner Institut**
Digital Engineering · Universität Potsdam



THE RESEARCHER

Dr.-Ing. Matthieu-P. Schapranow is leader of the working group “In-Memory Computing for Digital Health” and Scientific Manager Digital Health Innovations at the Hasso Plattner Institute (HPI). He performs voluntary work, for example, as a member of the Platform Learning Systems, the working group E-Health of the Federal Association for Information Technology, Telecommunications and New Media (BITKOM), and the Global Alliance for Genomics and Health.

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al data sources with case numbers for SARS-CoV-2 already in January 2020. Since the center of the epidemic was still in China at the time, the researchers focused on Chinese Internet sources. In a next step they established an in-memory database to store the number of cases worldwide. Thanks to the in-memory technology researched at the HPI, flexible real-time analyses of big data are now possible. In the database, the currently reported case numbers of infected, recovered, and deceased cases per country or region are stored together with corresponding timestamps.

So-called crawlers are used to automatically collect latest updated data. Such computer programs periodically check websites for the number of cases and automatically import them into the database once updated data were identified. In this way, the researchers were able to create a complete longitudinal database of the global number of cases, which now includes approximately 20,000 entries for almost 600 regions and countries around the globe.

Visualization is key to data interpretation

Evaluation of the data enables commenting on the current situation and analyzing data retrospectively, e.g. to identify trends in individual countries or regions. Software systems are used that support the exploration of big data with interactive visualizations. Fig. 1 shows an example that compares the case numbers from April 20 and May 20, 2020 using a pie chart per country. You can see how much the number of cases increased within just a month, especially in North America but also South America, in parts of Europe, and Russia. They exceed the numbers in the country of origin, China, by far.

The African continent supposedly has low case numbers. But is this really true? Researchers encoun-

ter another challenge here. They can access reported data from almost any country but have no influence on their quality. This not only refers to the correctness of the transmitted data but especially to definitions and assumptions of local authorities, for example, which criteria are used to decide whether a suspected case is reported as infected or not? Especially at the beginning of the year, there was a lack of capacity for comprehensive testing. Instead of a PCR test for viral RNA, other indicators, such as CT images of the lungs, were used to diagnose a case. These different procedures led to different measurement errors in the reported numbers per country.

In African countries with a less well-positioned health care system, systematic testing of suspected COVID-19 cases is extremely difficult. The documentation of suspicious cases and collection of data from regional medical centers also pose even logistical problems for local governments. Based on experience from previous epidemics, it can be assumed that the publicly reported figures represent only a small fraction of the reality. In addition, fortunately only a relatively small proportion of those infected develop serious symptoms that require hospitalization.

Quick prognoses thanks to artificial intelligence

For Germany, we know that many infected people only have slight or no symptoms and are, therefore, not registered even when they see a doctor. To take this error into account in national figures, residents of selected German Coronavirus hotspots were interviewed and tested by researchers. It is hoped that these regional studies will provide a more precise forecast of the real number of cases in Germany and a better understanding of the way the virus is transmitted. The database of the recorded COVID-19 data is also used at the HPI as the basis for forecasts. Methods of machine learning and artificial intelligence are used, for example, to forecast the number of cases in other countries or the effectiveness of measures based on the developments in China.

The sooner you can access the latest nationwide data, the faster you can take appropriate measures to deal with the current and any future pandemic. Established clinical processes for systematic testing, a central register for recording suspected cases as well as suitable IT tools for interactive and flexible evaluation of the data provide the basis for enabling medical experts to react even more quickly to the next pandemic.

DR.-ING. MATTHIEU-P. SCHAPRANOW
TRANSLATION: SUSANNE VOIGT



A person is walking a tightrope high above a dense, green forested valley. The person is in the center of the frame, with their arms outstretched for balance. The background is a vast, hazy landscape with a soft, blueish-grey sky. The overall mood is one of balance and risk.

UNDERSTANDING AND DECIDING

The Harding Center for Risk Literacy
now researches in Potsdam

What are the risks of a diagnosis using artificial intelligence, of health information websites or of health apps? The Harding Center for Risk Literacy, which was founded by the renowned psychologist Gerd Gigerenzer at the Berlin Max Planck Institute for Human Development, deals with such questions. At the beginning of 2020, the center became part of the Faculty of Health Sciences in Potsdam. But as soon as the moving boxes were unpacked, the Covid-19 pandemic broke out. And suddenly there were new questions ...

The Harding Center for Risk Literacy stands for education and knowledge. Its goal is to help people better understand the risks they face every day and to be able to deal with them more competently. For example, it summarizes the best scientific evidence on the potential benefits and harms of treatment, vaccination, and early diagnosis as well as medication and nutritional supplements in a way that is understandable to laypeople. But how can you properly assess the risk of a new type of virus that has been little researched? "People have to learn to critically inform themselves,"

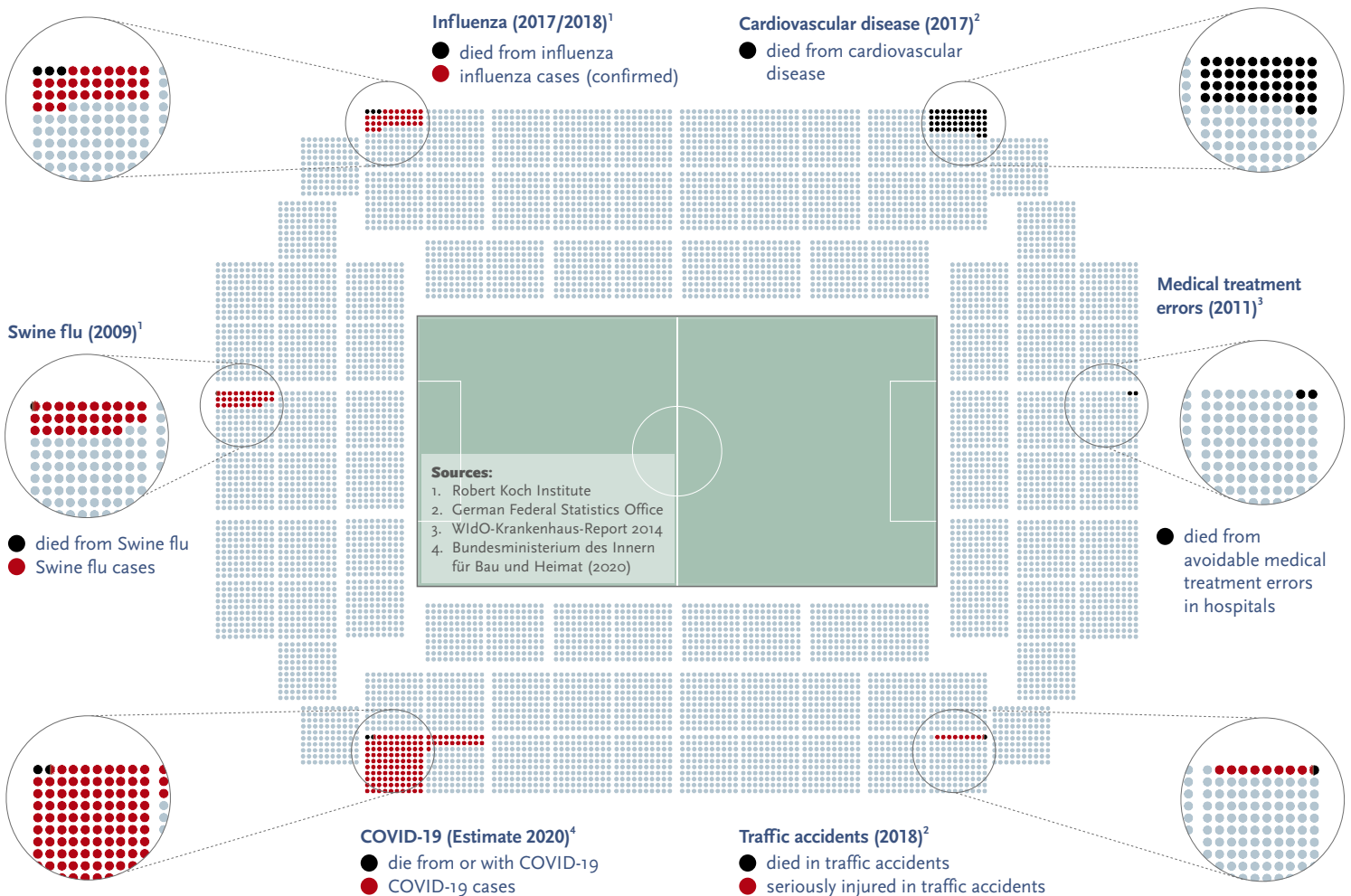
says psychologist Dr. Felix Rebitschek, who is the head of the center.

In order to contribute to this goal, his team has prepared facts known so far about SARS-CoV-2 and COVID-19 in graphics and tables. The so-called 'Fact boxes' of the Harding Center, for example, are an effective and approved remedy against ignorance. The researchers have specialized in developing analog and digital tools that enable people to make informed and efficient decisions.

Their first challenge was to compare the risk of a Covid-19 infection with other risks. For illustration purposes, they chose a football stadium with 10,000 seats (figure). The graphic compares the number of cases of COVID-19 in 2020 – converted into a proportion of the 10,000 stadium seats – with other diseases, everyday hazards such as traffic accidents and previous epidemics. The frequently cited flu season 2017/2018 is also deliberately listed here. An unusually large number of people fell ill and died at that time. But even in comparison with this extreme outbreak of influenza, the Covid-19 cases in the "football stadium" occupy significantly more seats. These cases are, however, still estimates for the year 2020 as a whole.

In order to show clearly and explicitly what can happen to people of different ages when they encounter the SARS-CoV-2 virus or what can happen to their fellow human beings if they spread it, the Harding Center has created various information boxes that enable a direct comparison with the flu but also clarify the existing uncertainty: out of 1,000 adults under the age of 60 who come into close contact with a person who is infected with the influenza or Covid-19 pathogen during a meal, for example, 3–70 people get influenza, but 90–170 people get COVID-19. 6–30 Covid-19 patients have to be treated at a hospital for severe symptoms, compared to a maximum of eight who contracted influenza. For adults under the age of 60 without preexisting conditions, even with COVID-19 there is only a minimal risk of death, but they fall ill more often and more seriously than from the flu, against which you can also be vaccinated.

The difference is even greater among people over the age of 60. Of 1,000 people who had close contact with infected people, 3–70 contract influenza, but 200–330 COVID-19. While up to 40 flu patients with severe symptoms have to be hospitalized, this number can be twice as high for Covid-19. In addition, a fatal





THE RESEARCHER

Dr. Felix Rebitschek holds a PhD in cognitive psychology. Since July 2020, he has been the Head Research Scientist and CEO of the Harding Center for Risk Literacy.

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GERD GIGERENZER AND THE HARDING CENTER FOR RISK LITERACY

“Our goal is to help people in their struggle to understand and assess the risks they encounter. We believe that our work can contribute to this”, says Prof. Gerd Gigerenzer, founder of the Harding Center for Risk Literacy. The former Director of the Center for Adaptive Behavior and Cognition (ABC) at the Max Planck Institute for Human Development (MPIB) and at the Max Planck Institute for Psychological Research is a psychologist and author of many books such as “Gut Feelings” and “Calculated Risks: How to Know When Numbers Deceive You”, which both were Science Book of the Year (2007 and 2002). These books deal with the question of how to make a rational decision when time and information are limited and the future is uncertain. David Harding, Global Investment Manager and Director of Winton Capital became interested in Gigerenzer’s work after his book “Reckoning with Risk” (US: Calculated Risks) was nominated for the Royal Society’s Science Book Prize. Their shared vision of an informed society led to the official inauguration of the Harding Center at the MPIB in 2009. After Gigerenzer was conferred emeritus status, the Harding Center’s time at the MPIB came to a close in 2019. Thanks to further funding by namesake and patron David Harding and the support of the University of Potsdam, the center can now continue its work at the Faculty of Health Sciences, a joint faculty with the Brandenburg University of Technology Cottbus-Senftenberg and the Brandenburg Medical School.

🌐 <https://hardingcenter.de>

course of the disease is much more likely. Of 1,000 people who had close contact with infected people, about two die from influenza, but 8–30 die from COVID-19. These are clear figures, which make the danger obvious despite existing uncertainties, but at the same time help to correctly assess the risks.

At the moment, many people are unsure whether they have already been infected without noticing and could infect others without knowing it. Especially for people who do not use the Corona warning app, the

Harding Center has created a “decision tree” that goes through all eventualities step by step: The first question is “Have you had at least 15 minutes of contact with a person who has been proven to be infected?”. If the answer is “Yes” an arrow directs you to a red box with an exclamation mark: “Higher risk of infection! Please contact your local health authority!” If you answer “No”, you will be directed to the next question. “Have you been in the same room as a person who is known to be infected? „If the answer is “Yes” you will be directed to a red box again. “Lower risk of infection! In case of flu-like symptoms, contact your local health authority!” Those who have answered no may turn to the next question and so on until they can be ruled out as a contact person. In addition, the Harding Center provides easily understandable explanations of transmission routes and symptoms. People with a suspected infection are advised to keep a diary in which they record current symptoms, body temperature, activities, and contacts. Anyone who is sick is given clearly defined rules of conduct.

Decision tree, explanations, and recommendations – there is space for all of this on a single sheet of paper, clear and concise. This is the strength of the Harding Center: unraveling a tangle of related facts, separating them from false reports and arranging them graphically so that they can be logically understood. The “VisRisk” project, a cooperation of the Harding Center and the Federal Institute for Risk Assessment (BfR), researched how results from health risk assessments can be visualized. They found that the combination of verbal and graphic communication reduces incorrect assessments and promotes risk-literate decisions. A team of psychologists, health and natural scientists translated the scientific findings for the general public, both verbally and visually. Using the knowledge and methods of cognitive decision-making psychology, it was possible to create informative, transparent and evidence-based visualizations that enable laypersons to quickly and easily assess the risk potential of food or consumer goods, for example.

In addition to such research projects, the Harding Center also conducts surveys of experts and the general public. “Advanced education and specialist training of physicians, journalists, and consumer protection activists are particularly important to us. Patients, consumers, and the general public depend on these multipliers and their ability to correctly interpret risks and communicate them in an understandable way,” Rebitschek emphasizes. “During a pandemic in particular, distorted media coverage is a problem because without having personal experience with rare risks, reports and statements from any other source, reliable and unreliable, become more important for the individual.”

ANTJE HORN-CONRAD
TRANSLATION: SUSANNE VOIGT

The researchers in Potsdam want to find out how to help chronically ill children brace themselves for psychological stress.



Healing Spirit

Psychologist Prof. Petra Warschburger investigates what helps chronically ill children and adolescents cope with psychosocial stress

Having diabetes already as a child – and also being depressed? Teenagers with juvenile arthritis who become aggressive? For some children and adolescents push really does come to shove. Quite a few of those who suffer from chronic diseases in childhood also develop mental disorders. Others, however, seem to be coping well despite the stress that chronic diseases can mean psychologically. Petra Warschburger, Professor of Counseling Psychology at the University of Potsdam, wants to find out why. She hopes to learn from those who can better cope with their situation in order to help others who are not able to manage so well.

THE PROJECT

COACH – Chronic Conditions in Adolescents: Implementation and Evaluation of Patient-centered Collaborative Healthcare

Participants: University of Potsdam, Charité Berlin, University Hospital Düsseldorf, and Ulm University
Funding: German Federal Ministry of Education and Research (BMBF)

Duration: 2017–2021

<https://www.uni-potsdam.de/de/ptz/coach-projekt.html>

It actually seems quite obvious: Those who are always sick are also more prone to psychosocial stress. But is that really true? “In fact, we have to assume that between 10% and 20% of children and adolescents with chronic diseases also develop mental disorders,” says Warschburger. The problem is that it often goes unnoticed. The focus is far too strongly on their somatic diseases. Injecting insulin, relieving pain, and keeping medical appointments – it is easy to overlook whether they can deal appropriately with the disease-related stress and everything that comes with growing up. And all this despite the fact that most of them will get medical treatment throughout their whole life. “Most often, patients develop internalizing disorders such as anxiety or depression that only become apparent when taking a closer look or searching for them. Only a few stand out due to externalizing mental disorders such as aggressive behavior,” Warschburger explains. “So most of these disorders go unnoticed – and untreated.”

How do you cope with dual stress?

There seem to be, however, many children and adolescents who have learned to successfully cope with their particular burdens. How do they manage to cope with their disease, with everyday stress, and the challenges of growing up? This has not yet become clear. Warschburger would like to better understand both aspects. To this end, she initiated the COACH project with partners at Charité Berlin, the University Hospital Düsseldorf, and Ulm University. They try to find out which special resources young people with a physical chronic disease have or develop that make it easier for them to deal with their medical condition but also with other problems – and protect them, so to speak, from mental disorders.

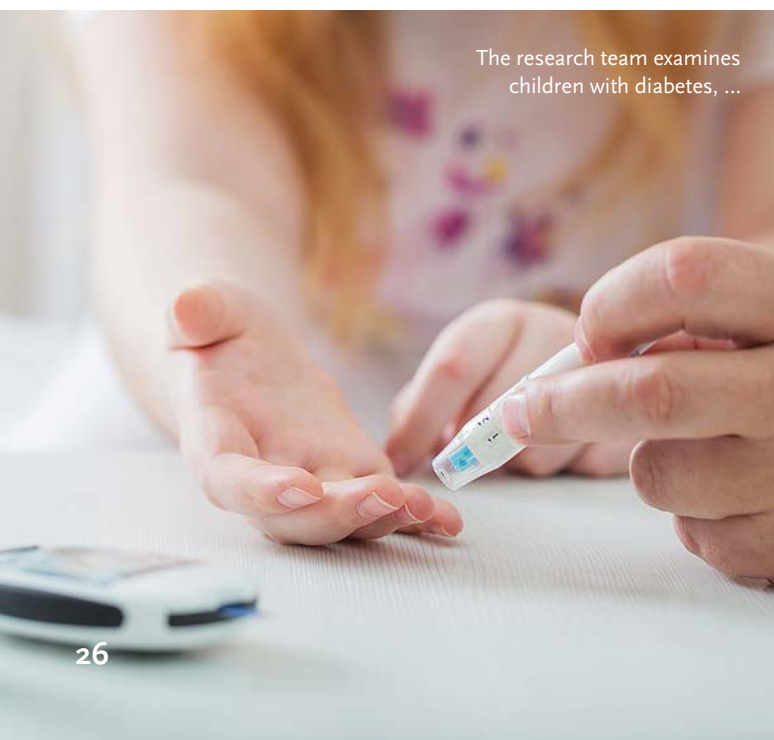
As a first step, COACH also aims to open the eyes of medical professionals to the stress loads of these adolescents. “Chronic diseases can significantly reduce the quality of life of the affected,” says Warschburger. They also have to cope with age-related developmental tasks, which are not always compatible with their disease, e.g. acceptance of their own body, identity development and preparation for work and family life. “To find out whether they have problems with this requires targeted questions. Otherwise you will not be able to find out.” Therefore, the psychologist hopes that the results of her project will improve psychological support for chronically ill children and adolescents. Much would be gained by integrating appropriate surveys and examinations into standard medical care. “If children who have to take medication all their lives do not want to take it, it may be because the pills are a constant reminder that they are different, that they are sick. Then you have to help these children here as well.” In fact, the clinical project partners included information and surveys into the medical care of eligible patients in order to recruit participants to the COACH study. If the project is successful, they hope that this extended psychological support could become widely accepted.



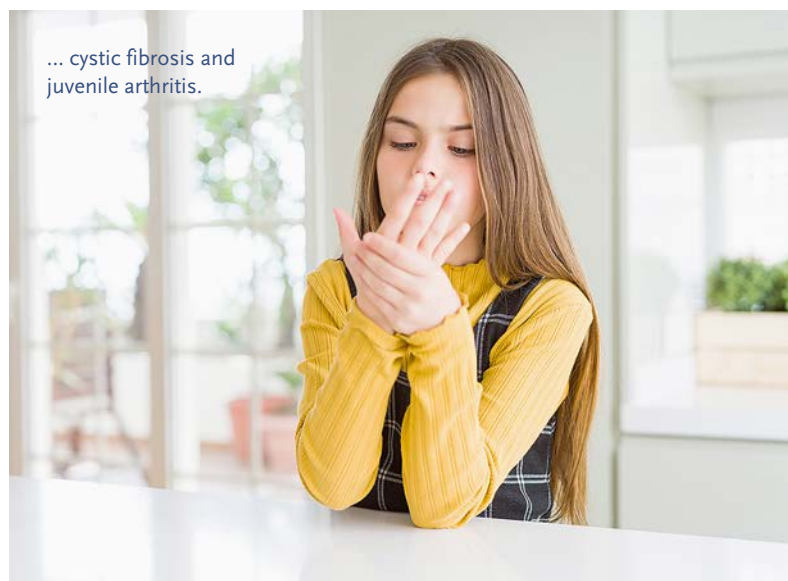
THE RESEARCHER

Prof. Petra Warschburger studied psychology at Trier University. Since 2003, she has been Professor of Counseling Psychology at the University of Potsdam.

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The research team examines children with diabetes, ...



... cystic fibrosis and juvenile arthritis.



Prof. Petra Warschburger

Finding important resources

The large-scale COACH study is intended to investigate how best to help chronically ill adolescents who also develop mental disorders. The researchers want to learn from those adolescents who are better able to cope with their disease. “We are primarily interested in the strengths, characteristics, and skills that make it easier to deal with the disease, especially in this phase of life,” Warschburger explains. These “healing” resources include optimism, self-efficacy, i.e. the conviction that one can master difficult situations, social resources such as a supportive environment, meaningfulness, empathy, and a sense of self-worth. While they are often worse off than other children and adolescents in terms of their quality of life due to their disease, quite a few draw helpful conclusions – what’s called “benefit finding” – from their situation. Through their disease they have become aware of their own strengths and recognize positive aspects. “We want to investigate which resources are particularly helpful. On this basis, therapeutic approaches for other adolescents could be developed,” she says.

The researchers initially identified possible resources in the literature, but also in many conversations – so-called qualitative interviews – with chronically ill adolescents. “We wanted to know their strengths, what helps them in difficult situations – what their treasure chests are.” Based on the results, Warschburger and her team then developed a questionnaire that about 200 test subjects were able to test, criticize, supplement, and assess. “We wanted to make sure we didn’t forget anything and were asking the right questions.” The full-scale study has now been started. It focuses on three chronic diseases: diabetes, cystic fibrosis and juvenile arthritis – three very different diseases that

can all have a major impact on the daily lives of those affected. These are initial factors that insure that the study findings are transferrable to other chronic diseases. In addition, there are established patient registries for all three diseases, which facilitate the researchers’ work enormously. With the help of the clinical partners, participants are currently being recruited to the study. The goal is to have 400 participants altogether who will be extensively informed and interviewed: about their fears, how they deal with their disease, what helps them and about many other aspects. Another survey will follow after a year. “Then we will see how their resources have developed, whether they are stable, how they feel psychologically – and what influence this has on their chronic diseases,” Warschburger explains. The project has gained an additional dynamic through the coronavirus pandemic, which affects chronically ill people as well as people with mental disorders twofold. The psychologists have therefore added relevant sections to the questionnaire. “Because we assume that the coronavirus crisis will also have an impact,” she says.

After the surveys have been completed the researchers will analyze the data and develop therapeutic approaches. “Depending on the resources that turn out to be especially relevant, we will be able to focus on the respective procedures,” says the researcher. “Should we concentrate on social support from family and friends or build on optimism and self-efficacy?” The various forms of intervention are then tested in two of the five COACH sub-projects. If the project group is successful, Warschburger’s long-term goal is to find new psychotherapeutic tools in the standard care for chronically ill children and adolescents.

MATTHIAS ZIMMERMANN
TRANSLATION: SUSANNE VOIGT

KEEPING COOL DURING A HEAT WAVE

How cities can better cope with climate change

THE PROJECT

Environmental scientists of the project **ExTrass (urban resilience against extreme weather events)** research how large and medium-sized cities can increase their resilience against climate change. They identify best practices as well as factors that promote and inhibit urban climate adaptation.

Participants: University of Potsdam, Leibniz Institute for Research on Society and Space, the municipalities of Potsdam, Remscheid, and Würzburg, Johanniter-Unfall-Hilfe and the research institute adelphi
Funding: German Federal Ministry of Education and Research (BMBF)

Duration: Oct. 2018 – Sep. 2021

<https://www.uni-potsdam.de/de/extrass/>



Heat waves, thunderstorms, hail, and heavy rainfall – extreme weather events are becoming increasingly common. Such events pose an enormous challenge for cities, as they cause severe damage and may also impact people’s health. Environmental researcher Annegret Thieken is investigating how cities can better prepare for such conditions.

It was extremely hot on July 26. While people in the Potsdam district of Drewitz were sweating, weather stations in this garden city measured maximum temperatures of 33.7 – 34.6 degrees Celsius on this summer day in 2019. A few weeks earlier, a team from the University of Potsdam had installed the weather stations in backyards, which are to collect weather data for three years. What makes this special is the fact that the researchers want to compare whether temperatures can be reduced through green backyards. It indeed seems to be a bit cooler in places where beds or patches dominate instead of concrete. The temperatures in green backyards were consistently lower than in those places where plants grew only sparsely. On average, the green backyards were only 0.3 degrees cooler, but depending on the weather and wind conditions the temperatures could actually be up to 2.3 degrees lower.

In the research project “ExTrass”, Prof. Thieken, head of the Geography and Disaster Risk Research group, and her team investigate the health threats of extreme weather events. Their goal is to find out how well cities are prepared for climate change and how to increase their resilience as the frequency and intensity of extreme weather events could further increase in the course of climate change.

Heat waves are considered the biggest health risk

Some enjoy it, others suffer: When the thermometer surpasses 30 degrees in summer, it can be uncomfortable or even dangerous for some people. Circulatory problems, nausea, and fever, or even a heat stroke with extremely high body temperature, severe headache, and fainting – all of these can be the result of excessive summer heat. Elderly people and children are particularly sensitive to high temperatures. The staff in day-care centers and nursing homes therefore faces particular challenges when it comes to preparing for heat waves -a task that increasingly poses challenges for such facilities.

Last year, the researchers of the “ExTrass” team surveyed staff at day-care centers and nursing homes, physicians, pharmacists, and the population of the three case studies involved in the project – Potsdam, Remscheid, and Würzburg. The answers provide information on how heat or heavy rain may affect health, how well people are prepared, whether they receive warning messages, and what they do for their own protection.

But first the researchers wanted to know what day-care centers and nursing home managers considered the most severe threats to public health. “Heat waves are clearly number one here,” Prof. Thieken explains the first survey results of the specialist staff. “Of course, you have to see this in connection to the time when the investigation took place in August 2019,” she emphasizes. At the time of the survey, the hot summer of 2019 was at its peak and widely affected people’s everyday lives. Second and third place on the hazard list were particulate matter and possible epidemics from pathogens, followed by heavy rain and floods as well as storms and thunderstorms.

Rebecca Noebel is setting up a survey mark in Drewitz.



Photos: Hopfgarten, Tobias (2)



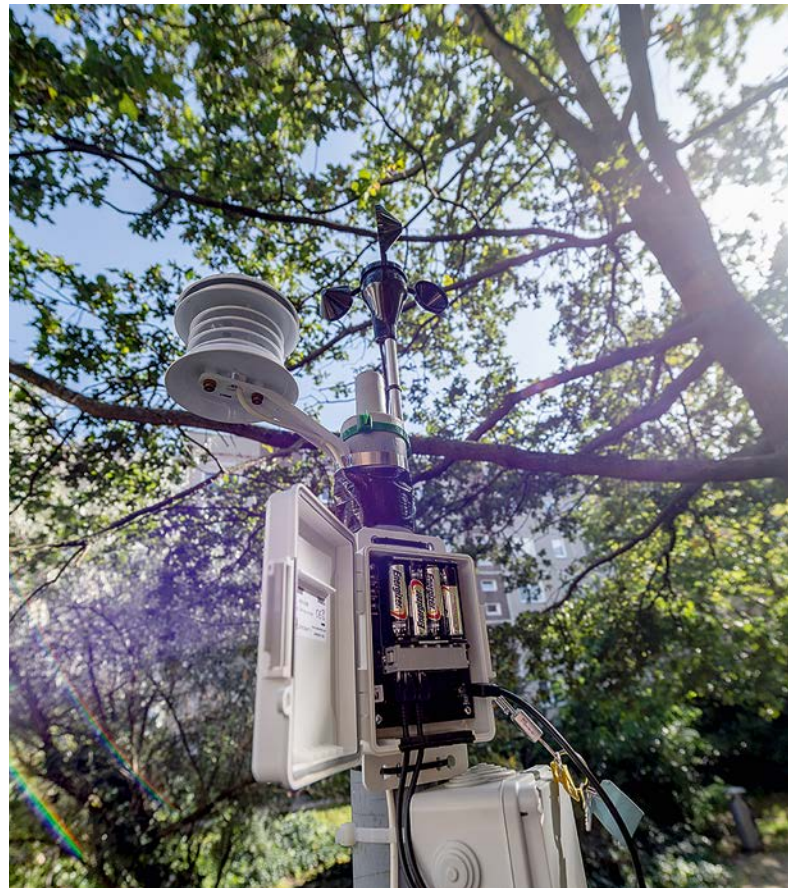
Katja Schmidt is reading the measuring station's data.



THE RESEARCHER

Prof. Annegret Thieken studied geo-ecology at Technische Universität Braunschweig and environmental sciences at the University of Amsterdam. Since 2011, she has been head of the working group Geography and Disaster Risk Research of the University of Potsdam.

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Day-care centers are least well prepared

Drinking a lot, providing shade and fresh air, not stressing one's circulatory system – these are the most important precautionary health protection measures in high temperatures. Care facilities such as nursing homes and doctor's practices are quite well prepared for this, says Thieken. There is often sufficient sun protection through roofs or sun shade sails and also air conditioning. "We see the greatest need for action in day-care centers for children." The staff there felt comparatively poorly prepared. "For example, there are no clear rules on when a day-care center may close due to heat," Thieken explains. This uncertainty puts additional strain on staff.

Together with Johanniter-Unfall-Hilfe, a practice partner in the project, the Potsdam research team is working on recommendations for action based on the survey and interview data.

These are intended to better prepare staff in these facilities for extreme heat events. Climate and heat maps can show the areas and buildings that are particularly affected by heat waves – for example because there are no cooling green spaces nearby or because dense building development impedes air exchange. It is also important that warnings of excessive heat reach staff in time. "This could be done directly by the city

administration, for example, who passes heat warnings on to the facilities," Thieken describes a possible link in the warning chain that could lead to improved management of health-threatening weather conditions.

Water playgrounds, sun shade sails, fans, light meals or façade greening are all helpful tools for day-care centers to make it through a hot day. They are already part of the recommendations for action that the researchers and Johanniter-Unfall-Hilfe are now refining and also want to test in workshops for their practical suitability. The researchers will also scientifically accompany the implementation of these measures in the facilities. "At the moment, however, it is difficult to precisely plan the process," says Thieken. Another catastrophe is getting in the way of the researchers: the Covid 19 pandemic is shaking up their plans. Workshops cannot take place, care facilities may not be visited, and the staff has reached its limit.

Nevertheless, project manager Thieken hopes to be able to provide viable and practical recommendations for action in about a year. Impressive data show the significance of prevention: In summer 2003, about 70,000 people died across Europe due to heat. And one thing is certain: The next heat wave will definitely come.

HEIKE KAMPE

TRANSLATION: SUSANNE VOIGT



“We can contribute to a better understanding of our time”

Historian Dominik Geppert
about turning points and the
task of history

In autumn 1989, the world went haywire and all eyes were on Berlin. The wall fell and within only a few months two German states became a united Germany. And in the middle of it all there was a young man, Dominik Geppert, who witnessed in awe what is now being taught as world history at schools all over the world. “I had the feeling that history is not something anonymous embedded in structures but something that affected my own life,” he says in retrospect. “A little later I started studying history.” Almost 30 years later, in autumn 2018, Geppert became Professor of Modern History at the University of Potsdam. He still has a passion for the period of transformation in Germany in the 80s and 90s – and the conviction that a look into history is important for shaping the present and the future.

“I am not among those who say ‘history is a foreign land that has nothing to do with the present’“, the historian says. “I believe that we can contribute to a

better understanding of our time. We can take two steps back and adjust the focal length in such a way that we have a greater depth of field – and thereby also contribute orientational knowledge.” For the historian, two steps can certainly cover quite a large distance. His inaugural lecture at the University of Potsdam in autumn 2019, for example, was titled “Brexit: A Historical Perspective” and explained the policies of British Prime Minister Boris Johnson – not always easy to understand for continental Europeans – through political traditions in the United Kingdom since the early modern period.

Geppert was born in Freiburg but grew up in West Berlin, where he saw the end of the Cold War dawn at his own doorstep. Besides history, he studied philosophy – as a kind of “free leg” – and some subfields of law. “I thought I also needed the perspective of a lawyer. In retrospect I’d say: You should study law properly or not at all.” As the son of a professor of criminal law, he knows what he is talking about. His father did



THE RESEARCHER

Prof. Dominik Geppert studied history, philosophy, and subfields of law in Freiburg and Berlin. Since 2018, he has been Professor for the History of the 19th and 20th Century at the University of Potsdam.

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not hold it against him that he did not want to follow in his footsteps. After all, his eldest son is continuing the law tradition. It did not take Geppert long to find his passion. During his second semester he was already fascinated by contemporary history. “I’ve always been interested in current developments and political events and how they relate to history,” he says. “That quickly led me into contemporary history.”

Berlin, London, Berlin

The historian found his first academic home in 1970s Britain. “The 90s in Germany under Helmut Kohl left many with the feeling of stagnation and of being hamstrung,” he explains. “Against this backdrop, I found the British history of the 70s exciting, when such a state of paralysis was broken with brute force and significant consequences.” This brute force had a name: Margaret Thatcher, about whose “conservative revolution” Geppert wrote his doctoral thesis. “I wanted to find out how this woman, who was an outsider in many ways, prevailed in the conservative party, which was highly paternalistic and aristocratic, and how she was able to turn the UK

inside out in such a short time.” Since the people believed the country to be in a crisis and longed for a regime change, improbable political solutions suddenly became possible. In addition, it came in handy for Thatcher that many of her political adversaries did not know how to deal with a woman as an opponent on the political stage.

Originally, the newly graduated historian wanted to start a career as a political journalist. But when his PhD supervisor Hagen Schulze went to London and offered him a position at the German Historical Institute, he took the opportunity. “I asked my wife, who is a French teacher, ‘What do you think about London? This is at least closer to Paris than Berlin...’.”

They lived in the English capital for five years. It was a very special time, as Geppert emphasizes, during which he got to know Great Britain, its people, and the British academic culture. He especially appreciates the intensive, open culture of debate of the local academic community as much as he sometimes misses it in Germany. “I sometimes miss debates that are explicit but not personal. In Germany, it is sometimes difficult to take a different position when 500 people are of the same opinion. Yet as researchers, we depend on being questioned and questioning things ourselves.” Nevertheless, it was not hard for Geppert to return. “You get to know your own country from a different perspective when you are abroad – and to appreciate it.” He went back to Freie Universität Berlin. There he was able to obtain a Heisenberg scholarship. Then he also had two interim professorships in Marburg and Bonn – and twins in addition to the eldest son, who was born in London. “That was great, but not always easy,” he admits. “While I was commuting to Bonn for a year, my wife and our three children were alone in Berlin, at least during the week.” When he got a permanent professorship there, the family moved to Bonn, too.



World politics years ago: Margaret Thatcher and Gerald Ford, 1975



World politics today: Boris Johnson and Donald Trump, 2019

Photos: Hopfgarten, Tobias (o.), Wikipedia (public domain) (2, u.)



Employees of the Potsdam Teacher Training College, 1960s

Transformation history – using Potsdam as an example

The historian looks back affectionately on his nearly ten years at the University of Bonn (Rheinische Friedrich-Wilhelms-Universität). After all, he published and co-authored the history of the university in addition to his research work and teaching. He put the four volumes on the rector's table in 2018 as a kind of farewell present for the 200th anniversary of the university before he moved to Potsdam. And he arrived at the right time here as well to join a research project that deals with the history of the University of Potsdam. It is about the transformation of the Karl Liebknecht College of Education at Neues Palais, the GDR Academy of State and Law in Babelsberg, and the Academy of Law of the Ministry for State Security into the new University of Potsdam. "That was an offer I couldn't refuse," says Geppert with a smile. "After all, I've already been exposed to this history. It is also helpful that I am new and have an external perspective on the controversially discussed history." It is also helpful that he leads the project on the "Transformation of East German Universities in the 1980s/ 1990s" together with Prof. Frank Busch, who is not only the Director of the Center for Contemporary History Potsdam (ZZF) but has also accompanied the debate about university history in Potsdam for a longer period. It is important to both of them that the study is set up as a comparison. In addition to the former Potsdam College of Education, the three PhD students in the project also look at the teacher training colleges in Halle, Leipzig, and Dresden. "This should enable us to make statements about developments in East Germany in general," Geppert says. "I believe that this will enable us to draw conclusions about the entire history of transformation in the former GDR, even beyond university history." After all, the changes in 1989/90 shaped academic careers as much as the lives of all other people in the country. "That's why we hope that



At Glienicke Bridge in November 1989

our project will contribute to coming to terms with the long history of the "Wende".

Geppert didn't come to Potsdam because of the university's history, however. Everything was just right. The focus on contemporary historical research at the local historical institute and the close collaboration with local institutions such as the ZZF, the Center for Military History and Social Sciences of the Bundeswehr (ZMSBw) and others appealed to him. He enjoys the opportunity to help shape the research profile of a young and aspiring university. "Ultimately, I also felt the need to deal more intensively with developments in recent history. Because of the GDR past and the proximity to Berlin, they are simply more present here," he explains.

"I was surprised how much the students, who were all born after 1990, brought up the issue of the German-German dimension in the seminars as their own history. As a teacher, that's simply fun." It shouldn't be difficult for Geppert to advance his own big project in the coming months and years, which is about the history of unified Germany after 1990 in the conflicting triangle of national unification, European integration, and global networking. "All three developments took place in close proximity – both in terms of time and space – and influenced each other. I want to elaborate on that." The Wende does not let Geppert go.

MATTHIAS ZIMMERMANN
TRANSLATION: SUSANNE VOIGT



ABOUT
SEARCHING AND
FINDING
WORDS

A psycholinguistic experiment

Authors are rich people. Their wealth lies in the words they have collected over the course of their lives: heard from mum and dad, heard in stories, found on the street, discovered while reading, felt in poems, and sung in songs. It is a treasure that, guarded and protected, does not become smaller when you share it with others. Anyone who writes, draws on abundant resources without wasting a single word.

It would be quite devastating for a journalist like me to lose parts of my vocabulary and not to find it again. And yet it happens with age. So a mixture of professional curiosity and nervousness brings me to Jana Reifegerste, a woman who is familiar with word-finding difficulties. She is a psycholinguist who researches language processing over the course of the lifespan. In her current project, she is investigating when and why aging affects morphological processing, both in healthy people and those with language-related disorders. The German Research Foundation funds the project, and Reifegerste will be able to test 280 subjects over the next few years – young and old people, students, professionals, and retired people between 18 and 89.

Jana Reifegerste welcomes me at the Potsdam Research Institute for Multilingualism (PRIM), which hosts her project. The room is almost empty – but I won't need much more than a desk, chair, laptop, and button box for the test. Before we begin I have to answer a few personal questions and prove that I am neither demented nor depressive – two conditions that would falsify the test result. So I draw a cube and a clock, count down in steps of seven, memorize a sentence at the beginning that I have to repeat at the end. Done! The slight discomfort that comes with such an examination disappears and I concentrate on my first task.

So far, it has been scientifically analyzed only to a limited extent how language changes over the course of the lifespan “because it was assumed for a long time that the lexicon and grammar, once learned, will be retained forever,” Reifegerste says. Language in the healthy aging process has been widely neglected in research although we all know that people can be at a loss for words and at some point experience it ourselves. The language psychologist wants to get to the bottom of word-finding problems in old age. When do they start? How do they develop? Why do some people struggle more than others? Reifegerste wants to get a comprehensive picture. In addition to the cognitive tests, she therefore also collects personal data about origin, health, education, and occupation as well as reading habits and social behavior.

While the researcher is sitting at the table next to mine recording my questionnaire, I dedicate myself to the experiment. I am reading sequences of letters and decide whether they are actually existing or invented words. “Barn” is a real word, “baran” probably not. That's easy, I think, and still feel comfortable, also with unusual words. It is my profession. In the next task, I have to form the plural of nouns. Here, too, the words come easy. Because of my job, I rarely think about the plural forms of a thing or a person. The computer doesn't want to know the plural of “campus”, but Jana Reifegerste asks me afterwards because she has heard so many different variations at the university. I know it's called “die Campus” in German, but because that sounds strange, I say “locations”. We laugh.

These first experiments on morphology are intended to identify how well and quickly the participants are able to combine the parts of the presented words and whether there is a difference between nouns with regular and irregular plural forms. “While it is enough to internalize the rule for regular forms, other forms must be learned and memorized,” she explains. If you want to form the plural of “car”, you just add an -s. Words like “ox” are not so easy. You cannot deduce the plural, you have to memorize it. “With age, access to this stored ‘dictionary’ gets worse,” says Reifegerste. Grammar skills, however, seem to be less impaired, but this hasn't yet been investigated in a large-scale study.

We continue the experiment. Two objects appear on the screen: a squid and a chimney. With a little imagination, I am supposed to decide which fits into the other. So I let the squid disappear into the chimney. Then the next mismatched pair appears. This time it is an orangutan and a lollipop. Then there is a band-aid and a phone and so on. While the absurd collages make me smile, I wonder what this game says about my language skills. I can't figure it out and I don't have time to think about it because the whole thing starts again. This time there is a different task, which

THE PROJECT

The Effects of Cognitive Changes across the Adult Lifespan on Lexical and Grammatical Processing

Funded by the German Research Foundation (DFG)
Duration: 2020–2022



THE RESEARCHER

Dr. Jana Reifegerste studied psychology, linguistics, and behavioral sciences in Leipzig and Montreal and received her PhD in the Netherlands. She is currently researching at the Potsdam Research Institute for Multilingualism of the University of Potsdam.

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I cannot disclose here so as not to influence potential participants. But I can say this much: I really have to mull over it.

It is well known that memory functions deteriorate with age. Attention also weakens and the speed at which our brain processes things slows down. It is unclear, however, whether people with diminishing memory will inevitably experience language problems. Reifegerste therefore takes a closer look at individual areas of memory. In addition to the declarative memory that stores facts and events, she tests the procedural memory with which people memorize practiced routines. This also



includes rule-based grammar, which is retrieved and applied without thinking. “It is difficult to become aware of such automated processes. You can’t explain how to do something that seems to work by itself,” she says.

I’d put the following test in this category: In front of me I see a series of smiles that flash al-



ternatingly. I have to quickly click on a keyboard to indicate where the face lights up: right, left, in the middle. Then: left, in the middle, right. The speed increases. The smileys are changing their position faster. At some point I start making mistakes and I'm happy when it's over. For the next task, I have to concentrate on an arrow and click on whether it points to the right or the left. To mislead me, other signs are positioned around the arrow. But I don't get distracted and focus on the center and successfully click through the test.

The ability to concentrate on only one thing and blank out everything else decreases with age as well, Reifegerste says. "You know this from talking to your grandparents who start wandering from the story they tell." It is normal for older people to slow down in everything they do. But does this slowing down also affect finding words? And how can you counteract this process? That is why the researcher initially asked questions about social contacts and reading behavior. "Those who don't read and speak a lot also use fewer words," she says, and inverts the question: "Can a lot of social contacts and frequent reading curb the problem of finding words?"

Now my working memory is being challenged: I am to remember the sequence of squares that light up one after the other and then make them light up in the opposite direction. Then it's about speed again: I see two squares with six dots each and have to decide whether they are arranged identically. I click and stare at the next pair – a game reminding me of playing dice. More and more new squares have to be compared. The dots dance in front of my eyes. Finally, I am released.

Reifegerste wants to better understand the course of changes in language. Little is known about it: "Most studies on aging examine students and compare them with seniors. It is interesting if they find differences, but we still know very little about when exactly these differences develop." Do they begin in mid-adulthood when you start to feel that something is changing? Or are people between 40 and 60 possibly particularly fit because they have a larger vocabulary than the average 20-year-old and do not yet feel age-related cognitive restrictions? At the end of the study in two years she will be able to say more about it.

ANTJE HORN-CONRAD
TRANSLATION: SUSANNE VOIGT

POLITICS AND ETHICS GO HAND INHAND

Fabian Schuppert considers political theory
a very practical matter





ten questions

Mountains or Sea?

Mountains.

...

Protest or Petition?

Protest.

...

Car or Bike?

Bike.

...

Welfare State or Free Market Economy?

Welfare State.

...

Water or Wine?

Wine.

...

Philosophy or Political Science?

Aargh, my heart says philosophy.

...

Email or Phone?

Email.

...

Revolution or Reform?

Revolution.

...

Paper or Book?

Book.

...

Unconditional basic income for all – Yes or No?

Yes.

...

Fruit or Chocolate?

Chocolate.

...

Equality or Justice?

This is a false dichotomy:

Justice has a lot to do with equality.

Mountains or Sea? Fabian Schuppert should decide – “Mountains”. Car or Bike? He is sitting in his office in Griebnitzsee, which he moved into only a few days ago and answers my questions – “Bike”. Reform or Revolution? It’s March 20 and in a few days the Coronavirus pandemic will have forced Germany into a standstill that may drastically affect society for years to come. One crisis gives birth to the next. – “Revolution”. Schuppert knows a lot about crises. He is Professor of Political Theory at the University of Potsdam and researches republicanism, social injustice as well as systemic risks and their consequences, for example the global financial crisis of 2008.

He also focuses on the question of how to implement environmental policy in the climate crisis without triggering new injustices or inequalities. The keyword is climate justice. He considers our society ill-equipped for the consequences of the Coronavirus pandemic: “We may currently protect those who are most vulnerable to the virus but not those vulnerable to the resulting social crisis,” says the researcher.

Fabian Schuppert’s academic passion is the theory that forms the basis of politics – or at least that should form it. Too often this is not the case, he explains. Normative values are often deliberately omitted in essential political debates – or used almost devoid of any content. “When Wolfgang Schäuble says in an interview that he thinks social justice is less important than for everyone to have a job, this drives me up the wall,” says Schuppert. “How can having a job be sweepingly placed above other values such as justice?” The inflationary and often unfounded use of value judgments is hardly any better. “That coffee is more sustainable, this action is fairer. It is often –neither acknowledged nor reflected how difficult it actually is to weigh or simply assess conflicting normative evaluations.” Ultimately, problems like these allure the researcher. He wants to build bridges between theory and practice. “Basic research is important to me, but its application is, too,” he says. “I have always been interested in specific political, economic, and social issues and want to help find solutions for them. Formal logical coherence is not as important to me as the question of how we can weigh or combine values in such a way that a decision is ultimately possible.”

There is a system behind the risk

That this is as difficult as it is important became apparent during the global financial crisis of 2008 because it revealed systemic risks of the financial world. “The analysis of this crisis has shown: The action or



Prof. Fabian Schuppert



failure of individuals cannot be identified as the sole cause,” he explains. “Rather, many players acted in an uncoordinated manner – for the most part within the legal framework – but together they created a risk

that threatened to collapse the whole system.” This is particularly problematic because the risk lies in the financial sector but has serious effects on almost the entire business and working world. The negative consequences of the crash were not only felt by bankers, hedge fund managers, and stock traders but also by innumerable people who were not involved in the system. Schuppert, therefore, researches two important aspects related to systemic risks.

“In terms of moral philosophy, it is important to clarify if individual players of the financial sector could have known more than others? Do we have to limit the possible actions in this system or what should governments do to protect their citizens from future financial crises?,” says the researcher. On the political-theoretical side, it is important to find out how institutions can adapt to these risks and reduce them. Should the state, which is repeatedly invoked as the last resort in major crises, act more as a framework setter again? “There is no such thing as absolute security, especially not in the financial system. But that doesn’t mean that we can’t discuss how we as a society deal with these risks and their consequences.”

As a professor of political theory, Schuppert brings together political science, political philosophy, and ethics – always with an eye to the particular political contexts and processes. “There are researchers who like working on pure political theory as the theory of politics and who look at processes, structures, and their functionality,” he says. “I’m approaching it from a different direction: I’m interested in the big norma-



THE RESEARCHER

Prof. Dr. Fabian Schuppert studied politics, philosophy, and history at the University of Göttingen and European culture in Glasgow. After working in Helsinki, Belfast, and

Zurich he has been Professor of Political Theory at the University of Potsdam since 2020.

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tive concepts and the question of how to apply them to reality because I think politics and ethics ultimately go hand in hand.”

From Che Guevara to climate justice

Schuppert has always been at home between disciplines. He studied politics, philosophy, and history in

Göttingen. At first he wanted to work as a journalist. But an internship with the German television news channel n24 proved him wrong. “I quickly realized that it was all about: Who has the best story, the fastest sound bite?,” he says. “I wasn’t interested in the flashy quotes, however, but the arguments. Then I soon realized that I would like to work academically.” In the second semester, he began working as a student assistant and got involved relatively early as an editor of a magazine for postgraduates. Not only was he already attracted to research during his studies but also to travelling. An Erasmus stay in Poland, during which Fabian Schuppert also met his future wife, put him on track. After his intermediate exams he decided to go to Glasgow. He studied European culture, dealt intensively with 20th century French philosophy and Polish literature, wrote his master’s thesis on the sellout of the revolutionary thought of Che Guevara and Mao. He then followed his wife to her Finnish homeland for a short time before he received a doctoral scholarship in Belfast. With his dissertation on a republican theory of justice, he created the core of his academic home there – between the worlds of philosophy and

Photos: Adobe-Stock – Halfpoint (o.); Hopfigarten, Tobias (u.)



political science. “The line of thinkers I have attached to extends from Hegel to John Rawls and Axel Honneth. I wanted to explore what it means when we want to have a society in which we all interact as equals. Do we all have to own the same things? Hardly. How to structure such a society – formally and informally? If, for example, cultures allow everyday sexism, we cannot assume that men and women actually meet as equals.”

Right after earning his doctorate he moved on to the Center for Ethics in Zurich – and took his topic with him. He was already reflecting on intergenerational and climate justice as a PhD student, but these two issues simply hadn’t come into play in his dissertation. He was also increasingly interested in social justice and alternative political economies. “After all, it makes little sense to talk about social justice without talking about economics.” But it is neither possible to restructure the financial system nor establish a socially just and fair climate policy overnight. Over the years, the climate crisis has become more important in his research, too. “If we accept that climate change is anthropogenic, we have to make radical cuts. There is no moral-philosophical justification for continuing as before.” But efforts to avert the worst could also create new problems. “How can you fight climate change effectively, fairly and with the right politics? How can the measures be legitimized more or less democratically – locally, nationally but also globally? That is not trivial at all,” says Schuppert. In current debates, one proposal, for example, is to plant trees on a large scale to counter the massive

increase in CO₂ emissions. But where? In Africa! “That’s a colonial perspective!”

Schuppert wants to contribute to putting climate policy on a fair foundation with his research because only then can it be successful in the long term. He is investigating, for example, how initiatives to improve land use cannot only help the climate but also the people who – so far – have lived on it or cultivated it. It is currently hotly debated whether bioenergy should be generated worldwide and on a large scale and whether CO₂ should be stored underground. “That would have an impact on the use of land the size of Australia – and of course on a lot of people,” Schuppert explains. “Not always to their advantage.” At the same time, there is a lot that can be done on a small scale and especially together with farmers, indigenous groups, and local initiatives – CO₂ storage at ground level (soil organic carbon), changed crop rotations, or better irrigation. “Climate policy that not only intervenes top down but acts cooperatively and does not neglect other values is fair and should be more successful.”

Crises demonstrate where we have to change something

After three years in Switzerland, Schuppert continued his academic trip through Europe and returned to Belfast in 2013. He possibly would have kept moving – had it not been for Potsdam. He actually did not expect to return to Germany in the foreseeable future, Schuppert says. “But what is being done in Potsdam – with the special focus of the department at the university, the close cooperation with the PIK and the IASS – that convinced me. The only thing that I miss is the sea. Well, I should have said ‘Sea’ at the beginning of our conversation ...”

Schuppert brought his wide spectrum of research interests with him and he doesn’t intend to take it easy now. In the light of current and recent crises there is no reason for it. “Crises give us the opportunity to see where our system is failing and where something has to be changed.” To accomplish such changes many people need to rethink. That, in turn, can only be achieved slowly. “Sometimes it seems more promising to start a revolution. But what good should come of it? I prefer reforms – my answer was probably wrong here, too.” First you have to achieve on an informal level that people consider something as desirable and feasible. And that can only be done step by step, says Schuppert. “This is where my work begins: You must not stop asking questions and questioning what is taken for granted. When you want to change something normatively this also includes conflicts. You also have to voice controversial ideas.”

MATTHIAS ZIMMERMANN
TRANSLATION: SUSANNE VOIGT

WHERE KUDU AND SPRINGBOK LIVE

RESEARCHERS FROM POTSDAM EXAMINE
IF GOOD WILDLIFE MANAGEMENT CAN HELP
THE SAVANNA





The savanna is in danger. The African grasslands – picturesque groups of trees on wide plains, large herds of wild animals passing by, vigilantly eyed by prides of lions and accompanied by the chirping of cicadas – is on the verge of being impoverished. In addition to climate change, this also happens because it is being used as pasture for cattle, sheep, and goats. This could be prevented by a political initiative that promotes settling and keeping wildlife instead of farm animals on larger areas. Researchers of the University of Potsdam together with colleagues from Berlin and Frankfurt and partners in Namibia investigate how this land use affects savanna ecosystems and how they can be controlled.

The same problem exists in many places in Africa: The intensive use of large areas as pasture for commercial animal husbandry is damaging the land. It degrades, as researchers say. Grass and trees that previously dominated the savanna are being replaced by thorny bushes and shrubs. As a result, the land is not only lost for livestock farming but it is also degraded ecologically. Potsdam researchers had already been looking for the causes of this development in the OPTIMASS project since 2014 – as well as for ways to stop or, at best, reverse it. “The extensive land degradation in Namibia has brought farmers and researchers together,” explains Dr. Niels Blaum, who led OPTIMASS together with Prof. Florian Jeltsch. When the grassland becomes overgrown with bushes, the farmers will lose their means of existence: Their animals can no longer find enough feed. “That is only the obvious loss,” emphasizes biologist Katja Geißler, who

coordinated the research project and was regularly on site in Namibia. But the decline in grassland has additional consequences. Where the sward no longer protects the soil, it erodes more easily. The rain flows off the surface and less seeps into the ground. Groundwater balance, nutrient cycles, and species composition change. The entire ecosystem is affected.

Can wildlife save the savanna?

When the OPTIMASS project came to an end in 2018, politically motivated changes began to create



Female kudu antelope



Photos: Heiring, Robert (o., u.)

completely new conditions. The concept of “communal conservancies” is one fundamental aspect. Where such “conservancies” are set up, it grants local communities sovereignty over their habitat, which also includes the rights to the use of land and wildlife. At the same time, people are responsible for the protection of the flora and fauna, thus making a significant contribution to the preservation of biodiversity. This has not only recognized local people and strengthened their

rights but also successfully contained illegal poaching. “Poachers became gamekeepers in many places,” Blaum says. “They usually had the best knowledge about wild animals in their region anyway.” Today, almost 40% of Namibia’s land surface consists of “conservancies”, of which about 25% are “communal conservancies”, i.e. state-owned land, and 15% private “freehold conservancies”.

In addition, 10% percent of the land are national parks and private reserves. They differ greatly, of course, in the way they use land and animals. The primary purpose of the national parks is to protect flora and fauna, while the “communal conservancies” only use resources for their own subsistence. “Freehold conservancies”, on the other hand, are associations of private farms for the protection of wildlife. They keep wild animals for commercial game meat production. Last but not least, there are “conservancies” and private wildlife farms that specialize in hunting or photo tourism and settle the respective animals. It is still completely unclear what effects it has on the savanna ecosystem that, as a result, more wild than farm animals are being kept, says Blaum.

That is why the Potsdam researchers launched a follow-up project together with their German and



THE RESEARCHERS

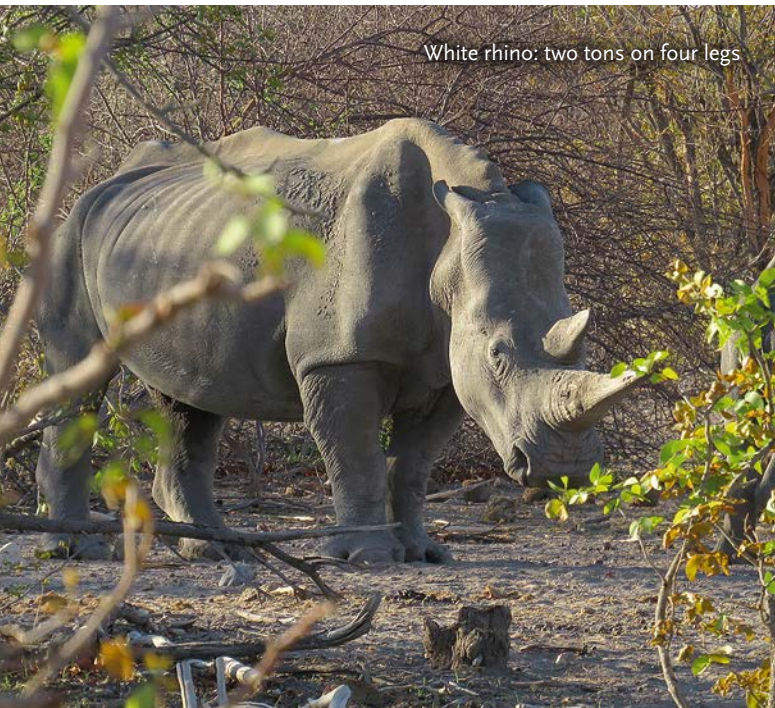
PD Dr. Niels Blaum studied biology in Nice and Frankfurt/Main. Since 2004, he has been research assistant in the Plant Ecology and Nature Conservation Group of the University of Potsdam.

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Dr. Katja Geißler studied biology in Berlin and Aberystwyth. Since 2009, she has been research assistant in the Plant Ecology and Nature Conservation Group of the University of Potsdam.

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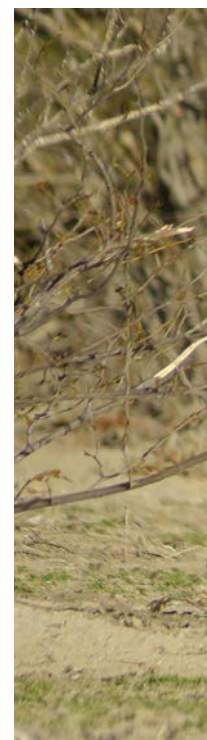
White rhino: two tons on four legs



Giraffe with solar GPS transmitter on its head



Dust storm during the dry season



Namibian partners: ORYCS. Its goal is to investigate whether wildlife-based management is suitable for the sustainable use of savannas. “So far there haven’t been any studies on whether it is better than the previously dominant livestock husbandry,” says Blaum. “For this reason we analyze the different types of use and how they can be optimized.” How does settling wild animals, quite often in different composition, affect vegetation? How do vegetation and water balance develop in areas with large springbok, kudu, or eland populations? How is climate change affecting the interaction of these factors? Can the local population in particular ensure a stable ecological balance? The researchers have to answer these diverse questions to understand this complex system. That is why the team includes researchers from a wide range of disciplines such as wildlife ecology, vegetation ecology, hydrogeology, geological remote sensing, and social ecology.

THE PROJECT

ORYCS – Option for sustainable land use adaptations in savanna systems: Chances and risks of emerging wildlife-based management strategies under regional and global change

Participants: University Potsdam (coordinator), Namibia University of Science and Technology, Freie Universität Berlin, University of Namibia, Institute for Social-Ecological Research, Ministry of Environment and Tourism Namibia

Duration: 2019–2021

Funding: Federal Ministry of Education and Research (BMBF)

<https://www.orycs.org/>

With GPS-transmitters and drones

The Potsdam researchers coordinate the whole project, which is headed by Niels Blaum. They also work on four of six work packages. During field observations, they collect data together with the Namibian partners. They provide animals and plants with transmitters, measure water fluxes and biomass in prede-

defined areas, conduct experiments on different vegetation systems and register the investigated areas with the most modern remote sensing technology.

In one subproject, Blaum himself investigates where exactly the wild animals live and move. “We are interested in how the most important herbivores in the parks influence their vegetation,” says the researcher. To this end, the ecologists record and ana-



Niels Blaum and Helena Wiskott



Field observations during the ORYCS summer school



Springbok with GPS neckband



Drone flight to register vegetation

the animals with an accuracy of a few meters and record where they stay for a longer time. “We can even see what exactly they are doing in the respective place: whether they are fleeing, walking slowly or standing, how they hold their heads and possibly eat and drink,” says Blaum. Ultimately, the researchers want to find out how wild animals interact with vegetation. To this end, Blaum and his team want to radio-mark a total of 50 animals of three different species that are at home in the conservancies they investigate: springbok, kudu, and eland, the largest antelope species in Africa. The researchers assume that wild animals are better adapted to climatic conditions and savanna vegetation than farm livestock. “The wild animals feed on bushes and trees, even the new seedlings. Cattle don’t do that at all,” says Blaum. “Because many bushes are ‘armed’ with thorns or store poorly digestible substances in their leaves.” Wildlife is therefore more likely to help limit or even reduce bush encroachment.

Since the wild animals in the conservancies are settled and kept by people, ORYCS is intended to clarify who is “getting on well” with whom. “The grazing pressure of wildlife also influences the architecture of trees and thus possibly the entire water balance of the are-

lyze the movements of wildlife over a longer period of time – and sometimes very large distances. One of the central study areas covers 70,000 hectares alone. To be able to follow the animals, they are caught and equipped with transmitters. These have GPS and acceleration sensors. This state-of-the-art technology opens up completely new possibilities for the research area “Movement Ecology”. The sensors not only locate

as,” explains Dr. Katja Geißler. The ecologist deals with water fluxes in the savanna. She and her colleagues combine various research methods to reconstruct this complex system. They register the vegetation in selected typical areas. They do this together with colleagues like the Potsdam geoscientist Prof. Bodo Bookhagen, who contributes his expertise in “eco-hydro-geomorphic remote sensing”. By analyzing satellite and drone images of the region, Geißler and her colleagues scale

the identified biomass to the entire investigated area. They record the soil moisture and provide selected trees with sensors that show differences in water fluxes. Some of the examined trees are artificially defoliated to be able to measure grazing by wild animals. “By comparing trees with different degrees of grazing, we can identify the influence of the grazing pressure on the water balance of the trees and the water fluxes,” she says. All measurements are ultimately brought together to map the “scale-crossing water fluxes” and to be able to combine them with the studies on the diversity of plant species. For this “eco-hydrological modeling of plant diversity”, the Potsdam researchers are collaborating with colleagues from Freie Universität Berlin headed by Prof. Britta Tietjen.



Looking for springboks



Suitable mopane trees are prepared for sap flux measurement

Photos: Hering, Robert (o. l.); Geißler, Dr. Katja (o. re.); Evans, Olwen | www.wolvenews.com (u.)



The research team in Namibia



All disciplines for one goal

All data and findings will ultimately flow into a scenario-based wildlife model that is being developed under the direction of Prof. Florian Jeltsch and Dr. Dirk Lohmann. It is intended to help make wildlife-based management both successful and environmentally friendly. “If we understand how the land surface is used, what effects the distribution of water, food, and predation pressure have, we will be able to develop recommendations for sustainable wildlife-based management.” Which animal and plant species fit together? How big can the populations be? How do the parks need to be designed so that the animals find optimal living conditions? “For example, the question of where to create watering places has an enormous impact on the parks,” explains Blaum. “Because the wild animals follow the water – and feed where they drink. Animals, plants, and water balance are inextricably linked and constantly influence each other.”

To ensure that the project results effectively help and actually reach the stakeholders in Namibia, the researchers work closely with farmers, park administrations, village communities, ministries, and tourism associations right from the beginning. The needs, interests, and demands of the people who live and work with wildlife sometimes diverge widely, as Blaum explains. “The pressure experienced by farmers is very different from park operators who specialize in photo safaris. While some keep large herds of antelopes, others have to ensure that certain popular animal species get along in their parks and find suitable habitats.” The Institute for Socio-Ecological Research (ISOE) is

committed to identifying and incorporating into the project the complex motives of the Namibian research and above all practice partners but also the valuable knowledge of the indigenous and local population. The institute, based in Frankfurt/ Main, works on moderating the conflict-prone challenges that arise from wildlife-based management.

Coronavirus as an inhibiting factor

The researchers were unable, however, to foresee a problem with global dimensions when they designed their concept: the Coronavirus pandemic. In early March 2020, Blaum and his colleagues, PhD students and students left for Namibia to collect large-scale data in the field over a period of three months following a joint summer school. “Unfortunately, we had to terminate our research stay after only three weeks,” says Blaum. “Air traffic between Germany and Namibia and some other countries was suspended as of March 16. Schools were also closed in Namibia. Eleven days later, there was another level of lockdown. Travel between regions within Namibia was prohibited. In the end, we were very happy to arrive in Windhoek on time and to be able to fly to Frankfurt/ Main on a government flight on March 29.”

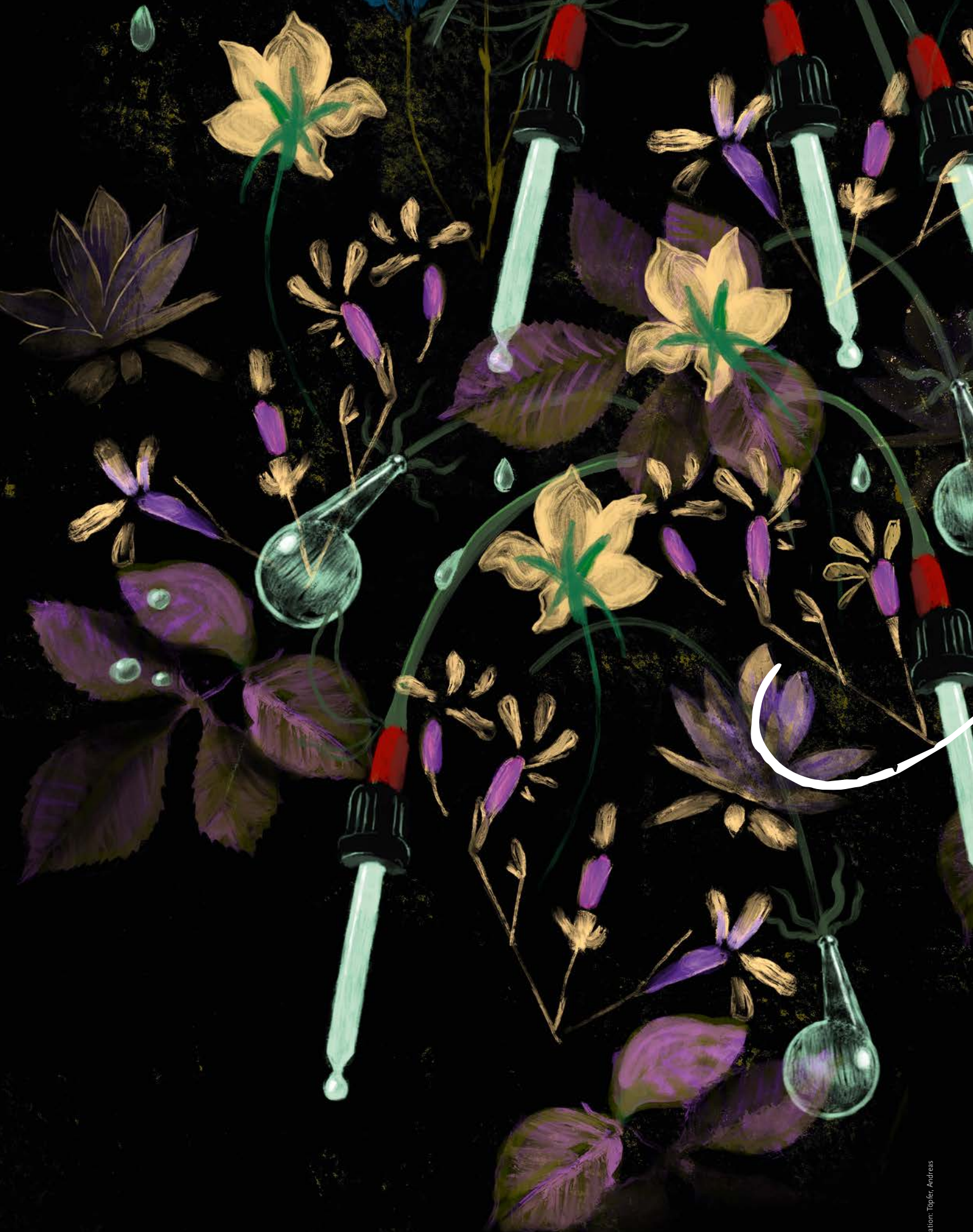
The fact that they had to interrupt their fieldwork has devastating consequences for the ORYCS researchers. Only a fraction of the animals could be radio-marked, and the examination of the vegetation also had to be stopped soon after it was started. Some measuring stations are equipped with rechargeable batteries and can collect data for a few weeks. “But we have virtually lost the field observation phase for this year,” says Blaum. They are already discussing with the project sponsor how to solve this problem. The coming weeks and months will show whether deadlines can be extended and additional finances can be provided. What is needed now is flexibility, imagination, and many good ideas. The interruption also has dramatic consequences for those students and doctoral candidates who depend on the project data for their theses. “We’re also trying to find solutions for that, but, of course, work will be difficult without any data.” That is why Blaum and his colleagues want to restart data collection with the help of their Namibian colleagues as soon as the local situation will allow it. “Our models can only become good enough with the data from fieldwork so that they can be used to predict how wildlife management will help flora, fauna, and the people even under changing climatic conditions.”

MATTHIAS ZIMMERMANN
TRANSLATION: SUSANNE VOIGT

Photo: Blaum, Dr. Niels

Project car that was bought in Namibia with the financial support of the University of Potsdam administration







**THE MEDICAL
TREASURE TROVE OF**

nature

Chemists from Potsdam and their African colleagues are researching new active substances from plants

Nature provides an abundance of medically effective substances. Only a fraction of them is known so far. Especially in poorer countries, where very few people can afford expensive medicine, numerous diseases are treated with locally collected medicinal plants. Chemists from Potsdam and East Africa are jointly researching which active substances are promising and how to replicate them so that as many people as possible have access to them.

The blossoms of the coral tree *erythrina saacleuxii* glow in a deep orange. The tree not only looks beautiful, it also has healing properties. In East Africa, to which the coral tree is native, people use the medical properties of its leaves and roots to fight bacterial infections and malaria.

Chemist George Kwesiga has been investigating for four years how the plant's medicinally effective molecules can be identified, isolated, and reproduced in the laboratory. The young researcher comes from Uganda and has been working in Potsdam for almost two years with a doctoral scholarship from the German Academ-

ic Exchange Service. Now he has almost succeeded. The vials at his workplace are filled with orange-yellow powders, cream-colored gels or light-yellow crystals. All of these substances are the results of the various synthesis steps that the chemist has to carry out. Ultimately, he gets a number of precious active substances that may be used in medical preparations and could help many people. From the traditional medicinal plant to a recognized medication, however, it is a long way, which Kwesiga is going together with research partners from Potsdam.

Like the coral tree, there are countless plants around the world that are mainly used locally in traditional medicine. "There is a lot of local knowledge about their healing powers," explains Prof. Bernd

The cooperation between chemists from Potsdam and East Africa is supported by the KoUP Funding Program of the University of Potsdam expanding international partnerships and joint research projects. In addition to sub-Saharan Africa, collaborations with Argentina, Australia, Brazil, Costa Rica, France, Israel, Canada, Colombia, Poland, Russia, the United States, Italy, the Czech Republic, Hungary, and China are being promoted in 2020.



George Kwesiga at the lab

Photos: Hopfgarten, Tobias (2)

Schmidt. He is one of three Potsdam chemists who channel this traditional knowledge in new directions together with cooperating African researchers. The researchers want to analyze the substance of the medical plants, synthesize them chemically and thus make them usable for significantly more people than before. To this end, the chemists have been working closely with researchers from Africa for over 20 years.

New help for neglected diseases

“Malaria has always been a big issue for us,” explains Dr. Matthias Heydenreich. Over the years, there have

been other diseases that can be treated with herbal active substances. Substances from plants that have not yet been discovered could be very effective against cancer, diabetes, and cardiovascular diseases. The Potsdam chemists also have diseases in mind that are insignificant in the Western world. These so-called neglected tropical diseases are not very profitable for the pharmaceutical industry and so medication is lacking. Leishmaniosis – an infectious disease caused by parasites and transmitted by sand flies – is a typical example. Millions of people contract it every year, especially in the tropics. The pathogens cause skin ulcers and also severe damage to the liver, spleen, or bone marrow. Those infected often seek help from local healers who alleviate their symptoms with local plants.

Especially for diseases such as leishmaniosis, the researchers hope to achieve a breakthrough with traditional and also with new herbal active substances. First, the chemical structure of the active substances has to be identified. Nuclear magnetic resonance spectroscopy is the method of choice that expert Matthias Heydenreich uses to scan and examine all the relevant molecules in the plant. The chemists use four powerful large devices with strong magnets and a seemingly complicated device made of tubes and cannulas for this analysis. Ultimately, all samples that are fed in result in complicated two-dimensional curves, graphics with point clouds and three-dimensional patterns of mountains and valleys. Those with a keen eye and years of experience can identify from these pictures which elements occur, how the atoms are linked and which bonds exist within the molecules. The experts call it structural clarification.



Photo: Hopfgarten, Tobias





THE RESEARCHERS

Prof. Dr. Bernd Schmidt studied chemistry at RWTH Aachen University. Since 2006, he has been Professor of Organic Chemistry at the University of Potsdam.

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Prof. Dr. Heiko Möller studied chemistry at the University of Hamburg. Since 2014, he has been Professor of Analytical Chemistry at the University of Potsdam.



Dr. Matthias Heydenreich studied chemistry in Halle and Berlin and is a nuclear magnetic resonance spectroscopy expert in the working group Analytical Chemistry.



George Kwesiga studied chemistry and mathematics in Nairobi. Since 2018, the PhD student has been researching in Potsdam.

Nature's blueprint

It is the first step on the way from the plant to the synthesized active substance. With the synthesis, you can kill several birds with one stone. On the one hand, only very small quantities of the active substances are in the plant. In order to be able to supply many people with it, you need large quantities that can be artificially produced in the lab with the right chemical recipe. On the other hand, the substances can be chemically adjusted so that they become even more effective or can be better tolerated. That is why Prof. Heiko Möller researches the mode of action of these bioactive compounds and which proteins in the body they react with. This also includes identifying the places where the substances have an effect. Which enzymes are blocked or stimulated in the body? Where do the active substances dock and what is necessary for this process? There are many open questions that need to be answered to understand how the plant molecules work.

“Nature provides the blueprint and we analyze which structures are actually responsible for the healing powers,” Schmidt explains. His expertise is required during the last part of the process – when the structures and effective mechanisms have been uncovered and the healing substances are to be synthesized. Schmidt has an eye for the chemical work steps that are necessary to change an atomic bond here or there or to add a functional group to a specific molecule to optimize its healing power. And ultimately, it is also about producing the active substances as inexpensively as possible so that as many people as possible can benefit from them.

Know-how and modern labs

In African countries, people are becoming more and more aware of the value of medicinal plants and are developing an increasing aspiration to research them. “Which scientific facts can be found in traditional medicine? Which molecules and compounds are produced by the plants responsible for the effect? These questions are becoming increasingly important for local researchers,” says Schmidt. Thanks to the cooperation with Potsdam, young scientists like Kwesiga can advance their research in the well-equipped laboratories and with the know-how of the research partners. Vice versa, researchers from Potsdam regularly travel to East Africa, run workshops with students and young academics and teach important methods to strengthen the work and expertise on site.

In the world's biodiversity hotspots – Africa, South America, and Asia – innumerable undiscovered plants and potential active substances against all kinds of diseases may still be waiting. “Some researchers estimate that about 90% of all plants are not yet known and analyzed,” Heydenreich says. So there is still a lot to do for chemists in the future. “We could work on it for 100 years and still wouldn't have finished.”

Kwesiga is confident that he will be able to successfully complete the last synthesis step in the coming months and chemically produce one of the medically effective substances of the coral tree. He has to complete a total of ten steps before he will have completed this synthesis from various chemical precursors. There is still a problem with the last point in the working plan. “You need a lot of patience,” says Kwesiga with a smile. Anyone who sees the vials at his workplace carefully labeled with structural formulas, which testify to the work he has done so far, knows that he has a good deal of it.

HEIKE KAMPE

TRANSLATION: SUSANNE VOIGT

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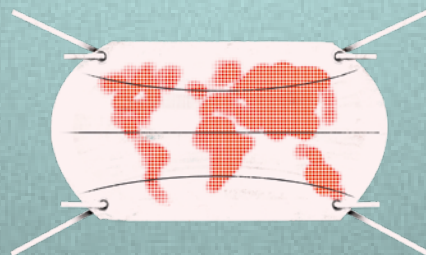
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