

LICHTGEDANKEN

The Research Magazine

07

INTERVIEW ON THE VERGE OF SYSTEMIC CHANGE

STUDY THE EAST IN THE DEMOGRAPHIC TRAP

REPORTAGE LIFE IN A MINING DESERT

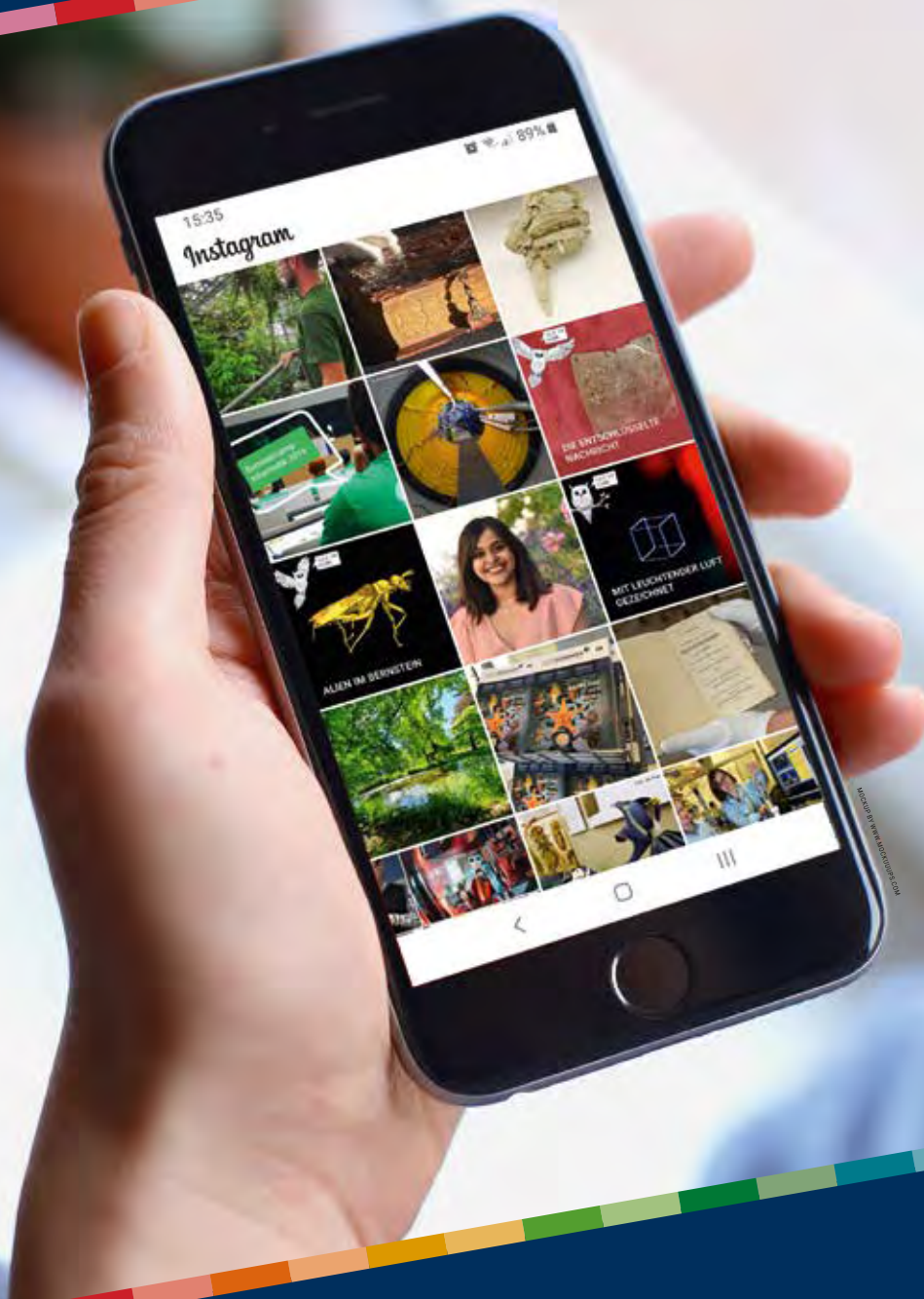


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Society in the jaws of crisis

What will tomorrow bring? People have always wondered what the future holds for themselves and others. Since the Enlightenment, contemplating the future has typically been linked to the prospect of progress. However, it is quickly becoming a concerning issue for a growing number of people: What does the future have in store for our planet in the face of dramatically advancing climate change and dwindling energy supplies and raw materials? What living conditions await future generations?

These questions are addressed in our focus article on »future without growth« in this issue of LICHTGEDANKEN. We take a look at the profound changes that are currently taking place in almost all spheres of life around the world—in the economy, political and social structures, and the environment. These upheavals are being driven by an economic and environmental crisis that has been described as a »pincer crisis« by sociologists Karina Becker and Klaus Dörre (p. 10 and 12). Our current way of doing business, transporting goods, and travelling around the globe has pushed the earth to breaking point. Further economic growth does not seem possible without exacerbating this ecological disaster. On the contrary, climate protection and the preservation of biodiversity require an urgent departure from our business and transport practices, which are primarily geared towards maximizing profits.

Many people also believe that our political system is in crisis. Political disenchantment, right-wing populism,

and anti-democratic sentiments are on the rise—especially here in East Germany, as shown by the Thuringia Monitor and the results of several state elections in recent months. The effects of the demographic situation in East Germany are reflected by our cover picture and discussed in detail on p. 21. Contemporary historian Norbert Frei is exploring the causes of growing right-wing populism in post-war Germany. He discusses his findings in our LICHTGEDANKEN interview on p. 24.

However, our magazine also offers some seeds of hope—quite literally. As presented in the LICHTGEDANKEN report, new life is blooming on the formerly dead heaps of a uranium mine (p. 36). Scientists from our University are getting the local nature back on its feet with the help of microbes.

I hope you enjoy reading our research magazine and look forward to hearing your feedback, comments, or criticism. You can contact our editorial team at: presse@uni-jena.de.

Jena, March 2020



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»Human races« do not exist

When the German Zoological Society hosted its annual conference at the Friedrich Schiller University Jena in September 2019, it published the »Jena Declaration« to present »race« as a racist construct. The authors urged people to stop using the term and to make a stand against racial discrimination. The »Jena Declaration« has been endorsed by the President of the Friedrich Schiller University Jena and the Executive Board of the German Zoological Society.

The document states that the classification of humanity into »races« has led to the persecution, enslavement, and slaughter of millions of people. Even today, the term »race« is still frequently used in connection with human groups. »However, there is no biological basis for this and there has never been one,« note the authors of the Jena Declaration. They add: »The concept of race is the result of racism, not its prerequisite.«

The »Jena Declaration« and other related information can be found online: www.uni-jena.de/en/190910_JenaerErklaerung_EN. KB



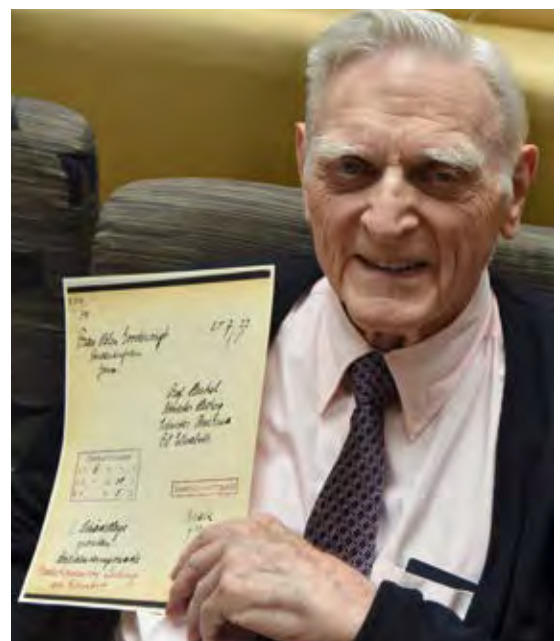
Foundations laid for »CeTraMed«

On 17 September 2019, building work got under way for the Centre for Translational Medicine (CeTraMed) at Jena University Hospital, where 14 research groups will investigate age-related diseases. The research building will cost around 28.3 million euros, half of which will be provided by the federal government. An additional 9.5 million euros will be contributed by the Free State of Thuringia; the project is also being funded by the University Hospital. The new building will be completed by 2022. AL

Nobel Laureate in Chemistry from Jena

In 2019, the Nobel Prize in Chemistry was awarded to the US scientist John Bannister Goodenough, an academic member of the Friedrich Schiller University Jena. The 97-year-old laureate was honoured for his contribution to the development of lithium-ion batteries alongside Stanley Whittingham from the UK and Akira Yoshino from Japan. The Nobel Committee lauded the work carried out by the three researchers for having profoundly influenced and changed the world we live in. Lithium-ion batteries have enabled the transition from stationary to portable electronic devices and advanced the evolution of mobility from fossil fuels to electric-powered vehicles.

This ground-breaking scientific work is precisely what led the University of Jena to present Goodenough with an honorary doctorate in 2018. The photo on the right shows the Nobel Laureate during his visit to the University in 2018, when he received his honorary doctorate. He is holding an excerpt from the birth register of 1922 in his hand—Goodenough was born in Jena. sl



New facilities for innovative energy storage

The construction of a new research building will create around 2,000 square metres of usable space at the Centre for Energy and Environmental Chemistry (CEEC) at the Friedrich Schiller University Jena. The »CEEC Jena II« will not only enable special investigations to be conducted on the innovative energy storage materials developed at the University of Jena; the research results will be made ready for industrial use at the integrated application centre.

The four-storey building has been designed by the architectural firm HDR GmbH. It will be completed by 2022, housing specialized laboratories, offices, and a technical centre.

Innovative concepts for new batteries, printed solar cells, and integrated façades for energy conversion are being developed at the CEEC Jena. »One of our goals is to develop safe and sustainable batteries that can function without vanadium, cobalt, and rare elements,« explains the Director of the CEEC, Prof. Dr Ulrich S. Schubert. MK

Less animal testing

In October 2019, Jena University Hospital received the Thuringia Animal Welfare Award for its »Critical Incident Reporting System for Laboratory Animal Science« (CIRS-LAS), an anonymized system used at multiple institutions throughout Europe.

The aim is to learn from other people's mistakes and prevent such incidents in the future. The project team evaluates failure reports and makes the information available to registered users. This helps to minimize the amount of animal testing in research while improving the safety of studies and treatments and preventing unnecessary studies. vdG



Two new communication centres

Communication and interaction are two essential aspects of science, which is why two new communication centres are planned in Jena: the FORUM in the city centre next to the Main Building of the Friedrich Schiller University (shaded black in the picture above) and the FOCUS building on the Beutenberg Campus. The new buildings are being funded by the Carl Zeiss Foundation, which has donated 18.4 million euros to the project.

JenaVersum relocates to the FORUM

»Jena has become an important city that attracts top-level researchers and young talent from around the world. In addition to excellent research centres and high-tech buildings, we require open and central spaces for interdisciplinary interaction, intercultural exchange, and for a noticeably welcoming culture,« emphasizes University President Prof. Dr Walter Rosenthal. The new buildings will house conference rooms, dining facilities, and living spaces for visiting scientists and scholars. The newly founded »JenaVersum«, a cooperative network between the University and its partners, will also be based in the FORUM. AB

New Leibniz Research Centre

The Federal Ministry of Education and Research (BMBF) is contributing around 150 million euros for the construction of a Leibniz Research Centre in Jena. The Leibniz Centre for Photonics in Infection Research (LPI) will provide the necessary facilities for technology developers, physicians, and medical technology manufacturers to conceptualize and trial light-based technologies for the improved diagnosis and treatment of infections. Infectious diseases are some of the most common causes of death around the world. Photonic diagnostic methods are particularly effective in the fight against infections, as they enable quick and sensitive measurements, allowing patients to be treated earlier and in a more targeted manner. LME







FEATURE

A future without growth

The »great transformation« of our society

We cannot carry on as we are: We are running out of time to tackle climate change; raw materials and fossil fuels are dwindling; and the older population in industrialized countries is growing. While in the past every crisis could be overcome by opening up new markets and resources and introducing new products and structures, the concept of perpetual growth has finally reached its limits. But what now? What will the world be like without growth? How will our living environment change with industry sectors falling by the wayside, skilled labour lacking, and young people moving away from entire regions? Sociologists from the University of Jena, alongside experts from other disciplines, are thoroughly addressing these questions and taking an analytical and critical look at our future.

Society at a turning point

The climate crisis is calling for radical changes in the fields of business, transport, and energy; digitalization is making our living and working environments increasingly fast and complex. Considering these major upheavals, sociologists are convinced that societal change has reached a critical point. We are on the verge of a »great transformation«. But are we ready?

BY TILL BAYER

Profound changes are taking place at all levels of society. »We are currently going through a period of political, environmental, and economic upheaval«, states Dr Karina Becker. The sociologist believes these fundamental changes share striking similarities with societal transformation processes, which were described by the social scientist and economic historian Karl Polanyi in the mid-20th century (see box below).

»The concept of transformation is so fitting because we are once again witnessing the emergence of right-wing populist movements throughout Europe. But the most significant parallel is the general crisis in which society currently finds itself«. According to Becker, the situation could also be described as a »pincer crisis«, because it is affecting society from both an economic and ecological perspective. The key question is whether we can decouple social well-being from the growth imperative. Becker illustrates this with a simple ex-

ample: Whenever the economy weakens, politicians fall back on measures to increase economic growth. This may generate social stability in the short term, but it also creates a new problem: »Growth ultimately leads to the overuse of resources and the exacerbation of environmental issues«, explains Becker. In return, the economy is pressured into transformations when it comes to political decisions made for the benefit of the environment, such as the urge to shift from combustion engines to e-mobility solutions. The »Post-Growth Societies« research group at the University of Jena has now conducted a study on the impact that these demands for transformation have on Thuringian automotive suppliers. Karina Becker and her colleagues have empirically recorded the extent to which small and medium-sized enterprises in the automotive value chain are aware of the issue and can develop new strategies. These companies form an important

part of Thuringia's industry, employing almost 60,000 people.

Short-time working allowance and professional development

The study concludes that these companies are limited in their ability to develop their own solutions for a CO₂-reduced future. Many corporate stakeholders underestimate the severity of the transformation, while others lack the resources needed to develop an independent strategy and help shape structural change. Until recently, the region in Thuringia under investigation in the study was characterized by deindustrialization and emigration; large-scale job losses in the automotive industry may lead to a considerable loss of material welfare, an increasing division of society, and a turn to populist views. »This makes the crisis in the automotive value chain representative of socioecological transformation conflicts as a whole«, says Karina Becker. It shows that employment, industrial, and environmental policy objectives have to be considered together. Becker believes responsibility lies with the policy makers: »A regional industrial policy is required within a comprehensive structural framework in order to raise awareness of the issue and point out alternatives«. A step in the right direction would be to introduce a short-time working allowance for workers affected by the transformation process, which has already been demanded by trade unions. She also highlights the need for investments in professional development schemes to open up new employment opportunities. ■

The »great transformation«

In »The Great Transformation«, a book written by Karl Polanyi in 1944, the economic historian and social scientist refers to a turning point in history. He believed the liberalization of the economy in the 19th century had brought about serious consequences: As land, work, and money had since been treated as normal commodities, he argued that a destructive dynamic had emerged, provoking socialist and fascist reshuffling attempts and threatening the existence of society. The »great transformation« has now been reclaimed by contemporary sociologists, who use the term to highlight the fact that we are currently going through another critical period of upheaval.



Dr Karina Becker is a sociologist who investigates topics like corporate fairness and occupational safety. She has been the scientific director of the »Post-Growth Societies« research group since 2016.

»The political system is remarkably robust«

What has led to the emergence of another »great transformation«?

For a long time, there was a common belief that modern societies are dynamic societies driven by growth; i.e. their stability was dependent on both growing prosperity and economic and technical efficiency. This may have worked well in industrial capitalism, but there has been a break in continuity for some years. The environmental impact of this growth path is becoming increasingly noticeable, and inequality is on the rise—especially within nation states in recent years.

Why do politicians beat around the bush when it comes to real changes with regard to the environment?

Because politicians have to represent and balance various interests. An SUV ban might make ecological sense, but it would be rather difficult to enforce, as it would be perceived as overly paternalistic by large sections of the population. As a result of the structural change imposed by environmental factors, many people are at risk of los-

ing their jobs. Companies in Thuringia are already referring to the situation as a significant turning point. These existential fears have to be taken very seriously in the political arena.

Is our democracy at risk if these fears increase?

The stability of a democratic system can generally be ensured by satisfying social interests. At the moment, however, there is evidence of polarization in society that may pose a threat to our democracy. The research group on »Post-Growth Societies« has examined the relationship between growth and social stability. The example of Greece shows that relative stability can also be achieved without growth. The country was almost completely ruined in the course of European austerity. Despite the lack of growth, however, the political system is proving to be incredibly robust—at least the basic economic institutions are not being seriously called into question. In other words, democratic systems possess strong self-stabilization capacities.

How can we respond to the »great transformation« as a society?

There is no catch-all solution, but rich industrialized nations should play a pioneering role by initiating and developing a social and ecological revolution for sustainability. We can only hope that as many countries as possible will join this strategy sooner or later.

Are you optimistic or pessimistic about the future?

I am optimistic when it comes to raising people's awareness about both sides of the pincer crisis—especially with regard to environmental issues, which have emerged from a niche area and burst into the social mainstream in just a few years. On the other hand, I am quite pessimistic about the growing social divide, as there is no sign of a real solution at the moment. However, I do not think we should just give up and turn our backs on one another. If people stop talking to one another, society will only become more polarized. ■



Capitalism has reached its limits

Capitalism is in crisis: The principle of »more and more« and »further and further« is obsolete, and growth can no longer be considered the most important criterion for the assessment of an economy. Klaus Dörre, a sociologist at the University of Jena, believes the world is on the verge of systemic change, but it remains to be seen whether stakeholders in business and politics can shape the necessary change towards more sustainability in an active and socially responsible manner.

INTERVIEW: STEPHAN LAUDIEN

You have spent a lot of time contemplating alternative economic models in the »Post-Growth Societies« research group. How might such alternatives shape up?

We need systemic change, so we should replace the term »growth« with »development«. New criteria are required; we should overcome our obsession with the gross domestic product (GDP). We could send a real signal by anchoring sustainability goals in our constitution—even at provincial level.

Why is systemic change necessary?

I think the capitalist principle of expansion, or »land grab«, has reached its limits. We can already see clear signs of post-growth capitalism. For example, the economy may have recovered since the financial crisis of 2008, but growth rates are nowhere near as high as before the crisis. Despite the frequent use of technology, labour productivity is also rising at an increasingly slow rate.

Why is that?

The days of cheap resources are probably over for good. Things which have always been free—such as clean water and air—

are suddenly being given a price. The pursuit of short-term profit is harming the environment without generating long-term returns. In other words, growth is slow to get going, and it is also linked to increasing inequality in national societies. We are locked in the jaws of an economic and environmental »pincer crisis«: The stagnation of the economy is causing a rise in poverty and unemployment, but the revitalization of economic growth through fossil fuels is exacerbating major ecological risks like climate change. This could be interpreted as a transition to a kind of post-growth capitalism.

Does the current system first have to crash? How can we succeed in our transition to a post-growth society?

We can either naïvely and passively wait for something to happen or we can actively shape change. For example, the end of the combustion engine in the automotive sector will hit Thuringia's supply industry hard—many jobs will be lost. Or let's take a look at Lusatia, where we must phase out lignite mining. In the face of climate change, the economy undoubtedly needs to be fully decarbonized by 2050. There are major problems in store for companies that rely solely on coal

Prof. Dr Klaus Dörre is a sociologist who researches and teaches in the field of change in working society at the Friedrich Schiller University Jena. He directed the »Post-Growth Societies« research group as one of three (and later two) spokespeople from 2011 to 2019.

or ignore sustainability requirements, but it is no use trying to sit out the change. The change will come, so stakeholders in business and politics must actively shape it.

How can we actively shape change?

By taking new approaches. Why not, for example, work with countries affected by hard structural change to create a model region for sustainable mobility, develop transport concepts beyond e-mobility, trial new mobility concepts, and help bridge the gap between urban and rural areas?

That would demand a certain degree of bravery in both business and politics.

There has indeed been little sign of this so far. Instead, stakeholders are calling for liberal market concepts, such as a special economic zone in the east with low wages, lower working standards, and even less corporation tax. These ideas have not proven effective in the past and will not prove effective in the future either. In fact, they are more likely to encourage even more qualified workers to leave the area.

But growth has always been promoted as our source of salvation.

The current generation of growth through fossil fuels is now reducing our quality of life. We need long-lasting goods that consume fewer resources and less energy. To put it more bluntly, it is good to stop driving SUVs, but it is even better to stop building them in the first place. We have to restructure society to meet our sustainability goals. This particularly includes the redistribution of decision-making powers from top to bottom. However, this does not mean that small and medium-sized enterprises (SME) should be nationalized—quite the opposite. As a federal state that is characterized and shaped by its SMEs, Thuringia must support these companies. But they must be encouraged to cooperate, or else they will not stand a chance in the future. For example, digitalization could offer tremendous opportunities, but many small enterprises lack the expertise required to make the most of these opportunities. That means the state must provide experts whose skills can be shared out amongst small enterprises.

In the face of climate change, there are growing calls for prohibitions and sacrifices, but politicians are ultimately shying away from such changes.

Prohibitions can restrict the freedoms of minorities that have so far been exercised at the expense of vast majorities. The most affluent 10% of the world's adult population is responsi-

ble for half of the world's harmful emissions, so the wealthy must be called to account! If we start burdening low-income groups with the costs associated with the transport and energy transition, we will have a situation on our hands like the yellow vest protests in France.

Swiss economist Mathias Binswanger claims that growth is the stabilizing element in our modern economies and that nothing works without it. Does that mean a lack of growth creates an unstable society, or do we need another stabilizing element?

Development also includes growth to a certain extent, but what really matters is what grows, how it grows and why it grows. Needless to say, there needs to be an increase in wages and income among the lower classes; otherwise, these social groups will not be able to afford organic products or high-quality, long-lasting goods. That is why the status of the social services sector has to be enhanced. If care work was given a higher value, for example, the standards for growth would also shift accordingly. Social services can only be streamlined to a certain extent, however, so their expansion would only ensure a slow degree of social growth. An alternative would be to use robots in nursing, but is that really what we want?

Climate change activists and schoolchildren are piling on the pressure, such as by demanding an earlier coal phase-out, but is society even ready for such a profound change?

Change is inevitable and imminent, so it is up to us to shape it in a socially responsible manner. We should take a similar approach to Alexandria Ocasio-Cortez, Bernie Sanders, and other democrats in the USA, who have developed a »Green New Deal«. They demand a quick and radical departure from fossil fuels and CO₂ emissions, as well as state-guaranteed employment for anyone who loses their job in high-emission sectors. And they are not referring to nonsensical jobs, but well-paid and fulfilling employment. People will only be able to afford more expensive products from organic sources if they are paid a living wage.

Aren't job security and the free economy fixed points that nobody likes to interfere with?

Jobs will be lost anyway when entire industries disappear. Instead, we should push ahead with product and process innovations in all types of companies, but this will not work without state initiatives or participation from below. History punishes those who sleep through change. ■

Post-coal conflicts

If we want to stop climate change and limit global warming, we will have to significantly reduce our CO₂ emissions. This view has become the general consensus. We have decided to phase out coal-fired electricity generation by 2038, and a growing amount of the power we consume is now generated from renewable sources. However, this movement is also being met with resistance, particularly in the coal mining regions themselves. Sociologists have undertaken a »deep drilling operation« in the lignite district of Lusatia to get to the bottom of this scepticism.

BY SEBASTIAN HOLLSTEIN

The Commission for Growth, Structural Change and Employment—commonly referred to as the »Coal Commission«—has proposed the decommissioning of coal-fired power plants in Germany by 2038. The country's last lignite mine is scheduled to be closed down seven years before. This will set major changes in motion, particularly in Lusatia, as many local workers, companies, and municipalities currently depend on this industry. This will not only affect economic sectors; society itself will also be hit. Like in a burning glass, we can observe the first transformation conflicts in eastern Brandenburg, which are forming in our society as a result of the economic changes caused by the fight against climate change.

The miners' pride in coal is the »backbone of Lusatia«

Given the status of coal as the local mining community's pride and joy, scientists from various German research institutes were encouraged and financially supported by the Rosa Luxemburg Foundation to investigate post-coal alternatives for structural change in Lusatia. On the one hand, they carried out quantitative and statistical analyses of the local economic situation and the associated future prospects—not least for the labour market. On the other hand, sociologists from the University of Jena conducted a qualitative partial study, asking workers at a local mining company and energy provider

(LEAG GmbH) for their thoughts on the country's phase-out from coal-fired power generation. For their »sociological deep drilling operation«, as described by project leader Klaus Dörre, the team interviewed 20 employees from all corporate levels in Lusatia.

The interviewees painted a relatively homogeneous picture of great scepticism towards the initiated coal phase-out—and for very different reasons. »There is a general sense of affiliation with coal and the mining profession. Mining has shaped traditions and families for several generations,« says Jakob Köster, who is part of the research team. »This producer's pride can be felt throughout the company. One of our interviewees described coal as the »backbone of Lusatia«. The departure from coal is therefore seen as a considerable deterioration of the worker's importance. Furthermore, the good working conditions and relatively high wages ensure a great identification with their employer. The employees may have occasionally criticized their own company for failing to proactively tap into new business areas, but they generally have a very tight relationship with the works council and management, says work sociologist Köster.

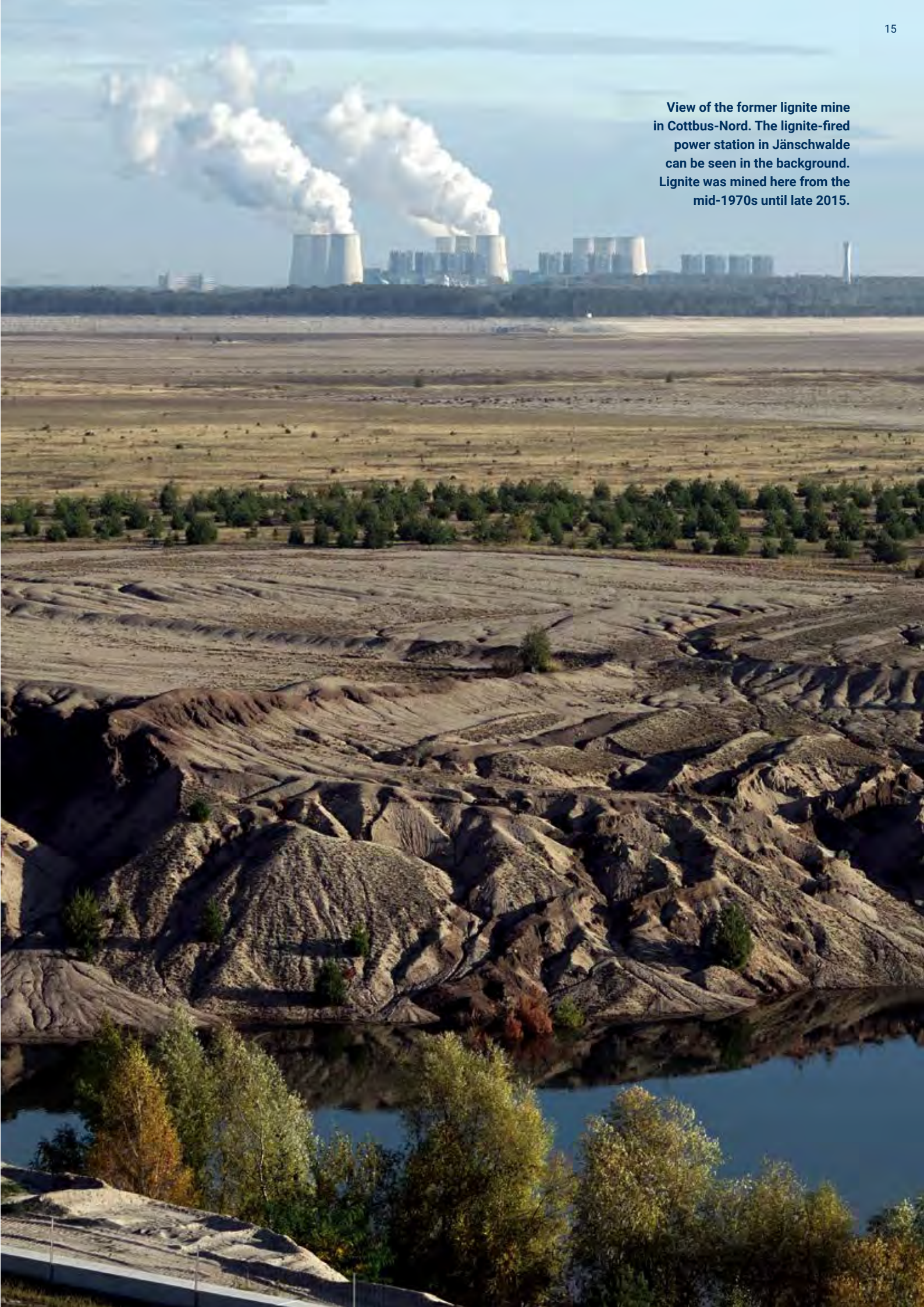
Many employees are also critical of the country's phase-out from coal-fired power generation, because they mainly consider it to be a hasty, politically motivated, and technically unsound decision that is practically impossible to implement without jeopardizing the security of the power supply. They believe

the departure from lignite-based power generation is premature, because alternatives are yet to be fully developed. The majority of respondents expressed understanding for the reasons behind the coal phase-out and do not want to be considered »Luddites«. »Just because I work in the coal sector doesn't mean I deny climate change,« said one of the workers. However, the workers disagree with the schedule, as there had previously been plans to significantly reduce mining by the 2040s. Only a minority of respondents expressed general doubts about man-made climate change, dismissing the associated discourse as ideological. Their criticism was not only directed against political decision-makers; they also accused the media—especially the local and regional press—of writing negative reports about coal and therefore not representing the interests of the local area.

The local perception of structural change is shaped by German reunification

The interviewees mainly see the impending structural change as a negative development, because it reminds them of their experience following German reunification. »This period is still fresh in their collective memory,« explains Sophie Bose, who conducted the interviews with Köster and other colleagues. »Everybody knows someone who lost their job and never recovered«. Nevertheless, only a few respondents fear for

View of the former lignite mine in Cottbus-Nord. The lignite-fired power station in Jänschwalde can be seen in the background. Lignite was mined here from the mid-1970s until late 2015.





Sophie Bose and Jakob Köster have been investigating the socio-economic impact of the coal phase-out in Lusatia: The profound structural change is creating a wide range of transformation conflicts.

their own jobs, as they will have already retired by 2038. But after the closure of many factories and the dismantling of entire sectors, such as the textile industry in the 1990s, there is a general fear that history might repeat itself and bring about the further decline of the region. »When the coal is gone, there will be nothing left—we heard that from a lot of respondents,« says Bose.

Many people's livelihood is at stake

A sense of social neglect is being projected on the local region and individual living environments. The locals' affiliation and connection with their region is now clashing with deteriorating social structures. »Relationships based on familiarity as opposed to selfish and aggressive mindsets and the pursuit of personal gain are a central component of popular beliefs on

good living,« write the sociologists in their evaluation. »If Lusatia is neglected, many respondents will begin to question their understanding of good living«.

The sociologists rounded off their impression of the situation in the summer of 2019 by interviewing people »on the other side« of Lusatia. This study is currently being evaluated. Some of the interviewees included local politicians, environmentalists, activists, and those directly affected by the effects of mining, such as residents who are scared of losing their homes to the mining sector. The views expressed by these respondents may have clashed with the attitudes communicated by the miners, but they did not devalue their past achievements. »Coal has had its day. That does not mean everything was bad,« says Sophie Bose, paraphrasing one of the respondents. »This is a view that could reunite the region«. And there seems to be an urgent need for such unity. The

second group of respondents in particular reported a clear social divide, whereby villagers were no longer talking to one another and social life had come to a standstill in places.

Transformation conflicts caused by economic structural change

In addition to facts and figures, such subjective assessments illustrate the socioecological transformation conflicts associated with structural change. Lusatia is representative of other regions and sectors; structures will also change in the automotive industry, and regions that are heavily dependent on it might bear witness to similar developments. That is why it is important to involve the local population in good time. »During our interviews, we were often told that people like to be heard,« says Bose. »They should be able to actively shape processes of change.« ■



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The state needs to play a more active role!

Commercial enterprises are facing growing challenges due to the dwindling supplies of fossil fuels, climate change, and global distribution crises. While political and corporate actors have typically relied on the self-regulating capacity of the free market in times of crisis, there is a growing number of voices calling for the proactive government control of the economy. What is happening at the moment? A digression with Uwe Cantner, an economic expert at the University of Jena.

BY UTE SCHÖNFELDER

The Nobel Prizes of the year 2019 have just been awarded: The laureates included three economists who were awarded with the Nobel Prize in Economics for their endeavours to alleviate global poverty. This came as no surprise to Prof. Dr Uwe Cantner. »In 2018, the award was presented to economists who had studied the environmental impact of economic growth, and the work honoured in 2019 once again concerned the negative consequences of our economic system,« explains the economic expert.

Proactive government policies for environmental and social issues

The self-regulation of the market—with minimum state intervention—is the underlying principle that has so far been endorsed by economists, but a fundamental change is taking place in the field of economics. »I have noticed that more and more scholars are assigning a more active role to the state. Things were different twenty years ago,« says Uwe Cantner, who holds the Professorship of Microeconomics at the University of Jena. »The market will definitely continue to fulfil its welfare-increasing role in the future, albeit in line with social and government missions, such as the energy transition«. The environmental and social impact of business cannot be overlooked; it must be tackled by policy-makers through proactive missions.

One of the current research topics examined by Uwe Cantner and his colleagues at the University of Jena is how states can assume their new role through the promotion of innovations. He explains

that states used to act more like a »repair shop«, playing a more cautious role when it came to generating and sharing innovations. »Given the complex social, environmental, and demographic challenges, this is no longer enough,« says Cantner. »States now have to pave the way as innovators. They have to control developments in such a way that the economy, environment, and social fabric fit together«.

For example, there is a need for proactive measures to cushion the social effects of innovations that will bring about radical changes, such as e-mobility and technologies for the use of renewable energy sources. However, this does not signify the end of free competition by any means. The role of the state is considered a catalytic one which, in the case of the energy transition, funds the development of non-fossil fuel technology and does not promote investments in fossil fuel technology. »This means the state can guide the economy in the proper direction while companies continue doing business on their own«. It is essential that the state interacts with society to develop missions that do not only reflect the objectives of the political elite, but rather consider the preferences and concerns of the population.

That takes a considerable amount of time and effort, because the stakeholders by no means share the same societal objectives, and the coordination of policies within our political structures is often a laborious task itself. »Missions have to be established and coordinated across all departments and evaluated according to their actual outcome. They also have to outlast electoral cycles,« states Cantner. ■



Prof. Dr Uwe Cantner is an economist who researches and teaches Microeconomics at the Friedrich Schiller University Jena. He is also the Vice-President for Young Researchers and Diversity Management.

»The role of the state is no longer that of a repair shop, but rather an active entity that sets objectives and catalytically supports them.«

(In)voluntary pillars of the welfare state

Volunteering is held in the highest regard. After all, those who voluntarily support others show community spirit and responsibility. 40% of Germans are involved in voluntary work—and this figure is on the rise. Yet, sociologists Prof. Dr Silke van Dyk and Dr Tine Haubner are critical of the volunteering boom. Even voluntary work has a dark side.

BY UTE SCHÖNFELDER

Collecting clothing donations, helping children with their homework, looking after dementia patients, accompanying refugees to the public authorities—more and more people in Germany are working for a good cause on a voluntary, unpaid or low-paid basis. »This, of course, deserves recognition and is very fulfilling for many people,« says Prof. Dr Silke van Dyk. Nevertheless, the sociologist at the Friedrich Schiller University criticizes this phenomenon, arguing that the state is unlawfully exploiting the work carried out by volunteers—especially in the social sector. Van Dyk further

summarizes the problem: »Voluntary work is often not so much of a voluntary choice, especially when volunteers have to rely on allowances to cover their expenses«.

State-sponsored shadow economy

Researchers have been observing profound socio-economic change for several years. While in previous decades the state and economy could rely on the fact that women would take care of the

household and children all day for free, women are now generally employed. There are nowhere near enough child-care facilities or elderly care services for family members; and so it is unclear who will take care of the tasks that were formerly family duties assumed entirely by housewives. Considering the demographic developments in Germany, these tasks will only increase. According to Dr Tine Haubner, volunteers are often the solution.

In principle, voluntary work is perfectly acceptable, she says, but when central public services are carried out



Sport & Exercise

16.3%



Nursery & School

9.1%



Culture & Music

9.0%



Social Sector

8.5%



Church & Religion

7.6%

In which sectors do Germans volunteer? These figures indicate the proportion of the total population in Germany aged 14+ who work as volunteers in different sectors. (Source: German Volunteering Survey of the Federal Ministry for Family Affairs, Senior Citizens, Women and Youth)

Prof. Dr Silke van Dyk (right) and Dr Tine Haubner are sociologists who see voluntary work as an important part of a functioning society—but only if volunteers are given a clearly defined role that does not coincide with the duties of the welfare state.



by volunteers who do not get paid or only receive an allowance to cover their expenses, we run the risk of informalizing and de-professionalizing the sector. »We can certainly refer to the situation as a state-sponsored shadow economy,« states Van Dyk, »because the lines between voluntary work and low-paid employment are becoming increasingly blurred.« A growing number of volunteers are being lured into the social sector through financial incentives—albeit below the minimum wage and labour law standards. Van Dyk lists some examples: »There are cash benefits provided to those who volunteer in the elderly care sector; there is a flat-rate allowance for exercise instructors and those working an honorary capacity; and people who participate in the Federal Volunteer Service are compensated for their expenses.« The problem is compounded by the issue of professionalism. If volunteers teach German and provide legal advice to refugees, this poses a serious question as to the quality of the services. The situation in the elder care sector is particularly controversial, highlights Haubner, who researched the exploitation of untrained caregivers in Germany for her doctorate. »Older women in particular complement their modest pension by volunteering in households with care-dependent persons.« There may be a clear distinction between the tasks assigned to volunteers and those assigned to professional nursing staff, but their roles constantly overlap in practice, such as when volunteers not only take a walk in the park with patients, but also help them go to the toilet or take their medication. »Re-

sponsibilities are not monitored in in households with care-dependent persons, so volunteers often fill the gaps that emerge in the world of elderly care marked by a shortage of skilled workers and time pressure,« says Tine Haubner.

Food banks— the poor are helping the poor

This type of shadow economy is creating double structures in the areas where there is a lack of initiatives offered by the welfare state: The professional services provided on the regular labour market are used by those who can afford them, while those without the necessary funds have to rely on the work of volunteers. While volunteering and honorary work have historically been carried out by the middle classes, the researchers are currently observing a phenomenon referred to as »the poor helping the poor«. The best example of this are the food banks where donated groceries are distributed to people in need. Those who volunteer here often depend on the food banks themselves, such as long-term unemployed and poor pensioners. »We are seeing that people from the secondary labour market who find employment at food banks through support measures do not make the transition to the primary labour market; they stay here as volunteers, often in the hope of further measures and because the work gives their lives structure,« says Silke van Dyk. Van Dyk and Haubner have revealed further negative aspects of voluntary work throughout their ongoing study,

which they are conducting alongside their colleagues Dr Emma Dowling and Laura Boemke. They are comparing types of volunteering and honorary work in East and West Germany—specifically in the federal states of Baden-Württemberg and Brandenburg. »When it comes to volunteering and honorary work, East and West Germany are still worlds apart—even 30 years after the fall of the Berlin Wall,« states Tine Haubner.

Besides the fact that—unlike in East Germany—the traditional and charitable housewife can still be found in great number amongst the middle classes of Baden-Württemberg, voluntary work is generally well respected in southwest Germany. This is not the case in Brandenburg, where voluntary work happens close to the labour market: People are drifting between the low-income sector, voluntary work and employment office measures, or they are complementing their unemployment benefits through work in the Federal Volunteer Service. 75% of volunteers over the age of 27 are long-term unemployed persons, so it comes as no surprise that volunteering has a different meaning in Brandenburg than in Baden-Württemberg. While in Brandenburg volunteering is often regarded as »working for free«, most volunteers in West Germany find it important that voluntary work is unpaid. »Voluntariness also means freedom and independence,« says van Dyk. This sentiment is hardly expressed by anyone in the East. »The people here take a more pragmatic approach—if you work, you deserve to be paid.«

Helpers in times of need and crowd pullers at every village festival—the Voluntary Fire Brigade is held in highest esteem.

The sociologists at the University of Jena have observed a particularly unsettling trend in rural areas in Brandenburg, where many people who are volunteering to help refugees are doing so in secret. »They do not talk to their neighbours or colleagues about it, and they do not go to the reception centre in their own car,« reports Silke van Dyk. They fear attacks and hostility from xenophobic, right-wing extremists and have often experienced such attacks.

Voluntary work provides space for civil society to thrive

In spite of all these problems, van Dyk and Haubner are not calling for the restriction of voluntary work by any means. »As a society, we need the obstinate and sometimes even rebellious form of voluntary work. We do not want a 100% state-regulated world; we need a space in which civil society can thrive.« Nevertheless, it is important to make a clear distinction between voluntary work and the responsibilities of the welfare state—for the protection of those who rely on the benefits guaranteed by the state, and for the protection of voluntary work itself. ■



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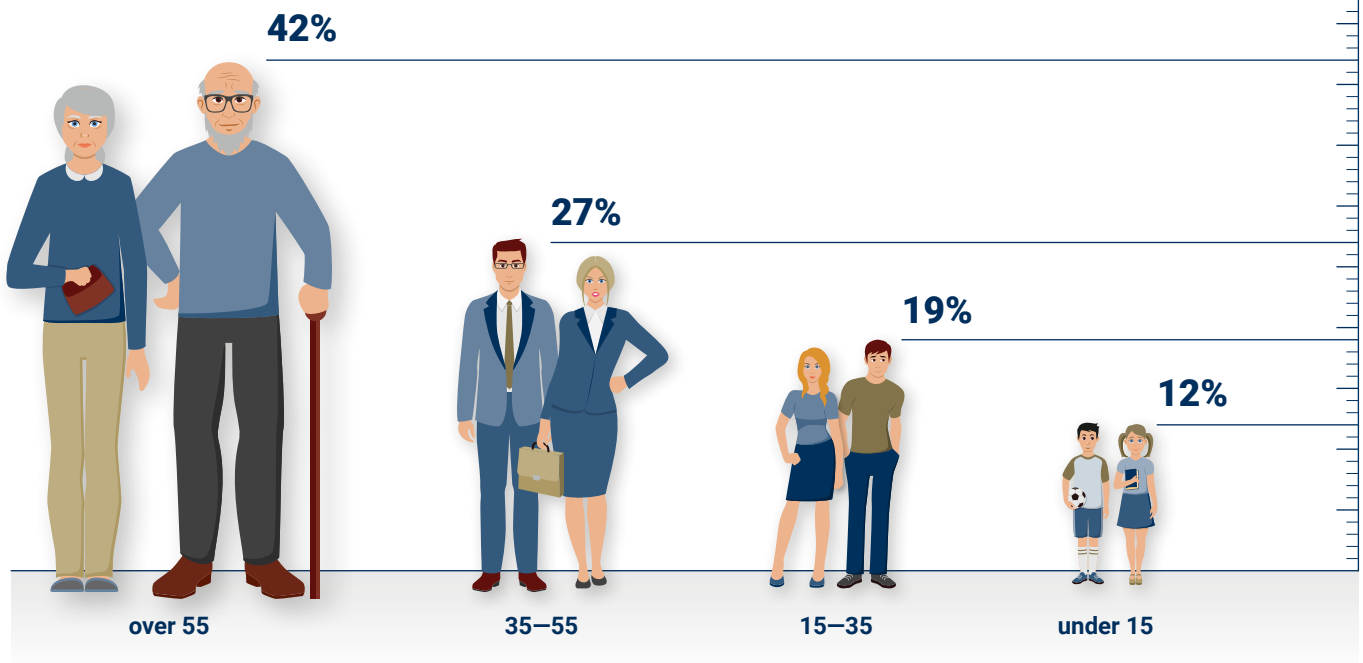
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How old are the people of Thuringia? Thuringia has three and a half times as many people over the age of 55 as children and adolescents under the age of 15. (Source: Statistical Office of Thuringia)



The demographic trap

Saxony, Brandenburg and Thuringia: Three federal states in eastern Germany have elected their state parliaments in recent months. The AfD (»Alternative for Germany«) has been elected as the second most popular force in all three state parliaments. The xenophobic and populist party questions the fundamental right to asylum, denies man-made climate change, and wants to leave the eurozone. But what makes this party so successful in the east of Germany? The sociologist Katja Salomo provides some explanations.

BY UTE SCHÖNFELDER

What makes large swathes of people vote for populist right-wing parties? Sociologists, psychologists, and political scientists agree—they are mainly driven by fear. Fear of globalization, fear of alienation, fear of unemployment. »The common ingredient to all these fears is the idea that people will be worse off and unfairly end up on the losing side in the future,« explains Katja Salomo. The young sociologist is investigating the relationship between such perceived disadvantages and voting behaviour. »Perceived disadvantages often result in xenophobic and anti-democratic sentiments,« she states. It therefore comes

as no surprise that right-wing populists are enjoying particular success in the eastern federal states, where they are presenting their simplistic solutions and political programmes designed to preserve and restore old ways. The feeling of being disadvantaged is mainly derived from a person's socio-economic situation. The east of Germany suffered an economic downturn after the country's reunification, leading to the collapse of entire industries, a rapid rise in unemployment, and with it the rise of populist parties. But according to Salomo, that alone does not explain the current electoral

success of the AfD. After all, East Germany has caught up economically over the past 30 years. There are new economic sectors; tourism is booming in many places; and the economic power of the eastern German states falls within the EU average. It can no longer be generally stated that East Germany is economically inferior to West Germany.

The demographic situation in East Germany is extremely precarious

Nevertheless, the situation in the east of the country is extremely precarious,



Sociologist Katja Salomo grew up in a community with around 1,000 inhabitants in Saxony. In her research work, she is also following autobiographical paths.

says Katja Salomo. »The demographic situation is more precarious than in almost every other region in the world«. Salomo came to this conclusion in her recent study on the relationship between intolerant and antidemocratic sentiments and the living environments of people in the State of Thuringia. Salomo mentions one of the findings of her study: »If Thuringia were a nation state, it would be the country with the second oldest population—behind Japan«. Furthermore, only six of around 200 states would have a lower percentage of young people under the age of 15, and only nine of the world's countries would have a similar excess of men aged 15 to 49.

Thuringia has four times more senior citizens than children

»This results in a demographic homogeneity that is unprecedented on both an international and historic level,« says Salomo. This situation may lead to fears of decline and the feeling of being disadvantaged—similar to the economic downturn that was triggered by the

country's reunification. This is particularly evident in rural areas and may explain why right-wing populists have enjoyed so much electoral success there. After all, while the unemployment rate in Thuringia has almost halved since the late 1990s, the ratio of over 50s to under 15s has grown by a quarter in the same period. Thuringia now has almost four times as many people over the age of 50 as children and adolescents under the age of 15.

Katja Salomo can only speculate as to why the perceived quality of life is shaped by the demographic homogeneity of the local population: »Due to the lack of children and adolescents, there is also a lack of leisure activities. When a population shrinks due to out-migration, bus lines are discontinued and shops are closed. There are fewer music events, sporting events, and street festivals—everything that forms the basis of social life,« says the 33-year-old sociologist. The precarious demographic situation is worsened by the fact that an above-average number of young women are leaving the state and resettling in the west. »Women have always been more involved in family life and invest

more in neighbourly relations«. However, Salomo emphasizes that the housing and living situation is only one of several potential socio-structural reasons for xenophobia and scepticism about democracy.

Young people are moving away despite low unemployment

Katja Salomo is personally inspired by the fact that she grew up in a small town in East Germany, giving her first-hand experience of many of the developments that she now investigates in her sociological work. German reunification also resulted in an economic downturn in her home town, a Saxon community with around 1,000 inhabitants. But even here, the economic slump was followed by continuous growth, a decline in unemployment, and the neat renovation of streets and houses. »But life was missing,« says Salomo. »And things have remained that way. There are only a few bus lines, so you can hardly leave town at the weekend and there is absolutely nothing for young people to do,« she recalls. No



This rural idyll is missing a touch of life. Improved bus and train networks would help combat the depopulation of rural areas.

cinema, no youth club, no sports facilities. »It is frustrating. If you can move somewhere else, you don't look back.« But how can politicians in Thuringia, Saxony and other eastern German states combat the out-migration of their people and the feeling of being disadvantaged? Katja Salomo's solution may seem somewhat paradoxical at first glance: »They have to ensure that people, especially young people, can get out«. The most important thing politicians can do for rural areas is to invest in sustainable mobility: »So those who are too young or old to drive also have the opportunity to take part in social and cultural life«. In the end, it is yet another economic matter: »Money has to be spent on ex-

panding bus and train networks«. Nevertheless, the sociologist from the University of Jena predicts the further out-migration of people from East Germany and the continued ageing of the local population. She believes the problem can only be addressed on a national level, as those leaving East Germany are mainly resettling in the west of the country. »East Germany has been demographically helping the west of the country by providing a stream of young and educated people over the past 30 years,« says Salomo. But the ageing of the population cannot be stopped in the west either. »The future of the west is already reflected in the east«. It is time to prepare for it. ■

»The future of the west is already reflected in the east.«

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Testing ground for the »Riders to the East«

The people of Thuringia went to the polls in late October. After the AfD (»Alternative for Germany«) had won almost a quarter of the votes in Brandenburg and Saxony, the party achieved a similar result in Thuringia: 23.4%. Under the provincial leadership of Björn Höcke, a radical right-winger, the party has become the second strongest political force in the Free State. Two days after the election, we spoke with historian Professor Norbert Frei. His book, »Zur rechten Zeit. Wider die Rückkehr des Nationalismus« (»The Right Time. Against the Resurgence of National Socialism«) was published in February 2019.

INTERVIEW: KATJA BÄR AND STEPHAN LAUDIEN

Have the people of Thuringia voted for the AfD despite or because of Björn Höcke?

I would like to say that a significant amount of the electorate voted for the AfD despite Björn Höcke and not because of him, but it is hard to make such a statement following the attack on the synagogue in Halle. I was hoping more people would now distance themselves from the party.

The AfD received a quarter of the votes—what does that say about the people of Thuringia?

The election result says something about the general situation in the east of Germany, where voter behaviour is

more volatile than in the west. In former West Germany, the socio-moral milieus of the Weimar Republic that had long shaped voting behaviour were largely reconsolidated after the Nazi period. There was no such opportunity in the GDR—the erosion process simply continued.

But that does not explain the election results over the past 30 years.

Since 1990, the east of Germany has been much more willing to experiment than the west of the country. The Liberals have enjoyed major success in Saxony-Anhalt on two occasions, and high results have also been achieved by the far-right political parties DVU

and NPD. And in the formerly »red Saxony« as well as in Thuringia, CDU prime ministers held office for many years, although they were mainly chosen for their personality and less as representatives of their party.

Why is East Germany so eager to experiment?

I think it is partly because people are not overly prepared to commit to one party after over fifty years of dictatorial single-party rule. They like to experiment and see what might work. For example, »Die Linke« has long been perceived as a protest party, which is why people voted for them—a role that the AfD has now assumed.

Prof. Dr Norbert Frei teaches Modern and Contemporary History at the Friedrich Schiller University and directs the »Jena Centre 20th Century History«.

It is striking that almost all the leaders of the AfD come from the west of the country. How do they fit with the voters in the east?

In our book (»The Right Time«), we refer to them as the »Riders to the East«. Some of them—such as Alexander Gauland who, of course, was raised in Chemnitz and only moved to the west in 1959—had worked in and with the CDU. They turned eastwards after German reunification and found a Germany that had long since disappeared from the west.

What do you mean by that?

They see the east as a Germany without all the »evil« related to the country's struggles to coming to term with its past, without the protests of 1968, and without immigration.

That sounds like a testing ground for the »Riders to the East«?

In fact, even younger people like the publisher Götz Kubitschek see the east as a land that can be moulded in their favour. This is where they can live out their ideals of a white, monocultural Germany that no longer exists in the west. This goes beyond mere protests; they have nationalist and racist transformation ambitions.

You mentioned the political milieus and the disassociation with such milieus in East Germany. What did things look like in the past?

The political maps from the Weimar Republic amazingly coincide with many regions today. As we know, the NSDAP encountered most difficulties in the strongholds of political Catholicism and the labour movement. By contrast, Nazi propaganda was welcomed much more quickly and enthusiastically in Protestant regions,

especially here in Thuringia. Even after 1945, radical right-wing parties found it easier in Protestant regions—and some have remained successful there to this day.

You are a historian, but we would like to ask for your thoughts on the future.

Historians often say it is difficult enough to predict the past! But on a serious note, I was just speaking to a colleague about my concern that the developments in East Germany might just be a precursor for a wave of right-wing populism in the whole country, which we can already see in the rest of Europe and beyond. I believe this is related to the revolution in our communication practices—in short, the destruction of the »bourgeois public sphere«, as Jürgen Habermas would say. But that is just one aspect.

You sound rather pessimistic.

Well, if everything really has become much more fluid, this also gives us a glimmer of hope: Things can change again quickly, so the AfD should not be so sure of its voters. Of course, right-wing hard-liners, racists, and anti-Semites will always be welcome in the AfD, but the party cannot bank on those who have chosen it for a protest vote.

The courts have ruled that Björn Höcke may be called a fascist.

His words certainly justify such a description, and there is no doubt about his ideological proximity to National Socialism. However, a court's permission to label him a »fascist« is not as important as our duty to pull apart his inhumane slogans and to make clear that none of his positions are truly conservative. ■

»Many AfD leaders are living out their ideals of a white, monocultural nation in East Germany.«

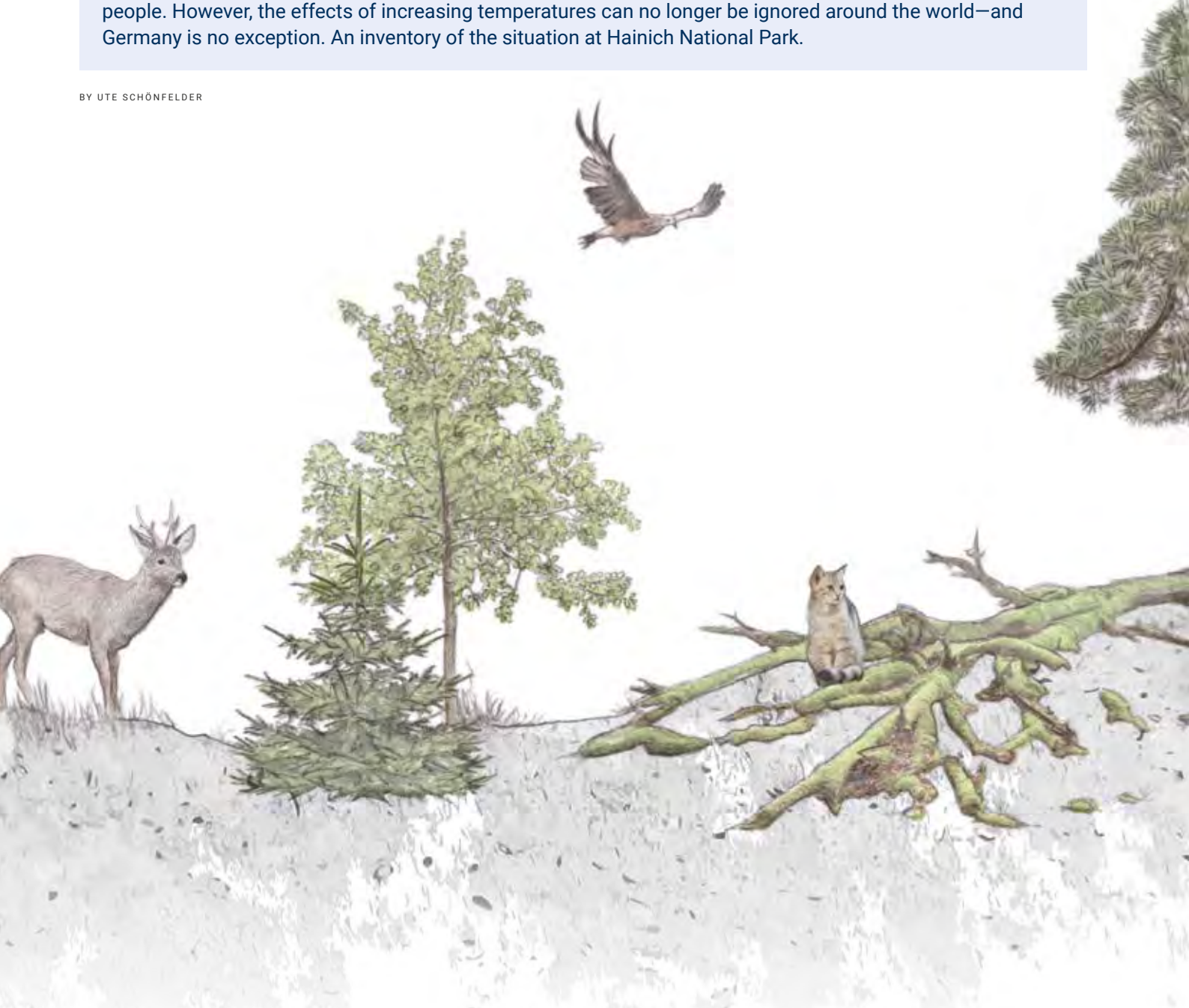


In his latest book, Norbert Frei works with Franka Maubach, Christina Morina and Maik Tändler to analyse the development of the far right in German post-war history.
ISBN 978-3-550-20015-1

Beeches in need

Pictures of advancing climate change have almost become a part of our daily reality: hurricanes, floods, melting glaciers. Despite the topic receiving regular coverage, it remains an abstract and distant issue for many people. However, the effects of increasing temperatures can no longer be ignored around the world—and Germany is no exception. An inventory of the situation at Hainich National Park.

BY UTE SCHÖNFELDER



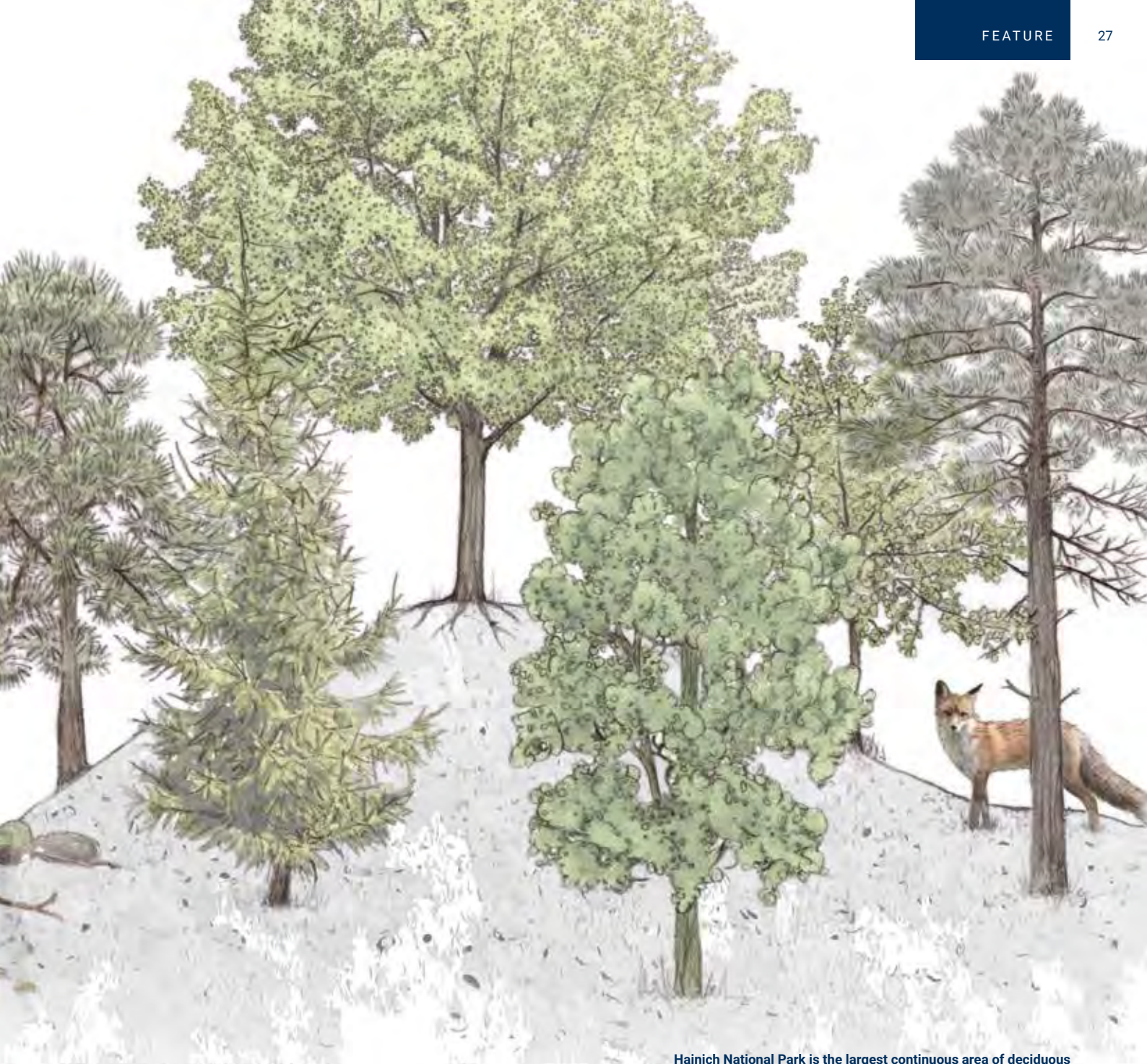
About one third of Germany is covered by forests. The beech is the third most common tree in German forests after the spruce and pine. And similar to spruce and pine trees, beech trees are acutely endangered.

Half of the trees are damaged

The extreme droughts of the last two summers have been especially harm-

ful. The effects of climate change are dramatically visible at Hainich National Park, a 75 km² wooded area in western Thuringia that forms part of the UNESCO World Natural Heritage Site »Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe«. A team of researchers at the University of Jena is observing the trees from above. Their images are alarming—vast numbers of beech trees are dying.

The extremely dry summers of 2018 and 2019 have left the forest in a precarious condition. »Across vast areas almost half of the trees is damaged or even dead,« says PD Dr Sören Hese. He is sitting in his office at the University's Institute of Geography and pointing at aerial views of the forest on his monitor. The dense greenness of the treetops is speckled with numerous grey spots (see p. 28). »These grey areas are leafless treetops—mainly beeches,« explains Hese.



Hainich National Park is the largest continuous area of deciduous woodland in Germany. The southern part is a protected national park, where the trees grow without direct human contact. Hainich National Park is home to an estimated 10,000 animal, plant, and mushroom species. Many deciduous trees flourish in the nutrient-rich shell limestone soil. The most common tree is the European beech.

As part of an ongoing collaborative project with the managers of Hainich National Park and »ThüringenForst«, the earth observation expert and his colleagues from the Department of Earth Observation are examining the woodland in the nature reserve from an aerial perspective. They are using a drone to survey the top of the forest with pinpoint accuracy. The drone weighs around 1.5 kg and has a diameter of 45 cm; it climbs to 100 m and

flies along preset areas in a fully automated manner, allowing the researchers to map around 5 km² of forest per day.

Pinpoint elevation models of the treetops

The drone captures thousands of frames during the survey campaigns, which take place regularly between July

and November. »The image sections are chosen in such a way that 80% of the area captured by each frame overlaps with the frames taken before and after,« explains Sören Hese. The individual frames are subsequently converted into an overall image. This method also allows the researchers to create detailed, precise elevation models of the treetops, as the drones capture each point from different perspectives and can measure their position in real time.



Image left: The Hainich National Park near Kammerforst. This orthomosaic map of the treetops has been generated from a large amount of individual drone shots. Heavily damaged treetops are shaded grey.

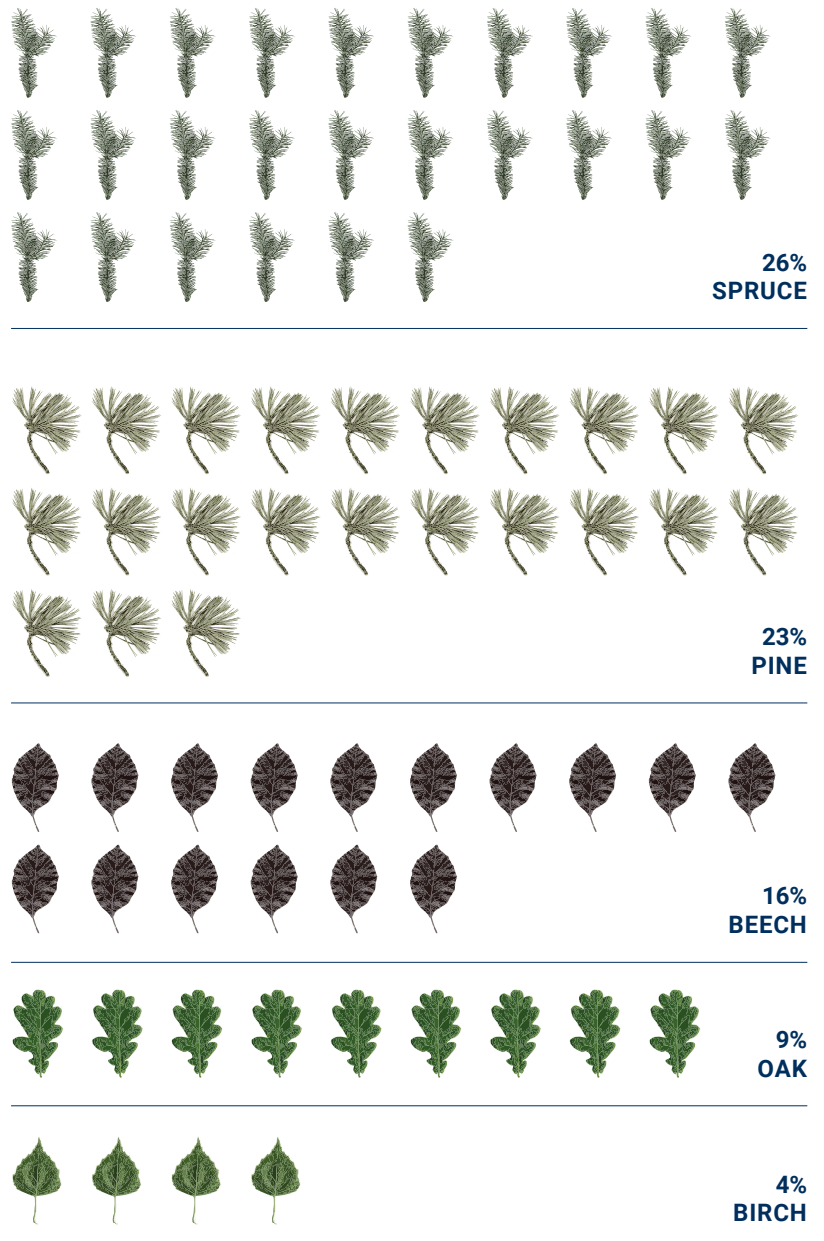


Sören Hese stands at the top of the 40-metre Flux Tower at Hainich National Park. This is where the drone is launched. Illustration below: The five most common tree species in German forests. The beech comes in third place as the most common deciduous tree.

The photographs captured 2019 paint a dramatic picture. Hese is currently evaluating them to map changes in the forest following the hot summer of 2018. Even outside the hotspots on exposed hillsides, beech trees are dying in great numbers. »Up to 30% of the trees are already dead in several areas,« states Hese. This is confirmed by the latest ground-based reference studies that national park authorities have conducted. It remains to be seen whether partially defoliated trees and those with only a few tiny leaves will recover next year.

The oldest are the first to die

Beeches whose treetops are in the highest area of the forest are under particular threat. These huge trees are around 180 years old, and some are even older. »These older trees are the first to die,« says Hese as he opens an animated elevation model of Hainich National Park generated from 1.2 billion elevation points. The defoliated treetops are easy to spot during the drone flights, as they individual peaks protrude from the canopy below. This problem may primarily be affecting beeches, because they have more superficial roots than other trees, such as oaks, and therefore cannot reach water reserves deep underground. The survey data not only provides the national park authorities with a comprehensive inventory report; the results are also useful for the remote sensing experts in another way. They can be used as a reference for satellite data to record changes in forest vegetation. »We use data from the ESA earth observation satellites Sentinel-2A and -2B,« explains Hese. The satellites con-



tinuously measure the light reflected by the earth and its atmosphere in different wavelength ranges, such as in the infrared and visible range. »We look at time series of these spectral images and use them to detect changes to wooded areas throughout the year,« says Hese. The satellite signal is altered by leaf growth in summer and spring, defoliation in autumn, and the stress of droughts. »However, we can only determine which specific tree changes are responsible for the changes to the satellite signals by comparing drone images and conducting onsite analysis«.

The extent of the changes becomes evident upon closer inspection of the satellite images captured in the summers of 2018 and 2019 at the same time of year (see figure below). The images show a 25 km² area in the western section of Hainich National Park, presenting satellite data from the short-wave infrared, near-infrared and red spectrum of light. »The differences are significant,« explains Sören Hese. While the wooded areas are primarily green in the false-colour image from 2018, the image captured in 2019 is streaked with large, dark brown patches. These changes are caused by the lack of absorption in the red wavelength

range, as the chlorophyll in the dead leaves is no longer active or the leaves are simply missing. The near-infrared range also shows altered reflectivity; this is due to the reduced or missing foliage and the high level of reflection in the near-infrared range that would otherwise be present as a result of intracellular spaces. Finally, absorption is reduced in the shortwave infrared range, because less water was absorbed than in the summer of 2018 as a result of drought stress.

Lasting changes caused by the hot summers of 2018 and 2019

What does the future hold for beeches at Hainich National Park? This largely depends on how the climate develops over the coming years and whether some of the beech trees can recover over the next twelve months, says Sören Hese. But one thing is for sure: The hot summers of 2018 and 2019 have left a lasting impression on the appearance of Hainich National Park. ■

False-colour satellite imaging of the western section of Hainich National Park from the summers of 2018 (left) and 2019 (right), used to measure the reflection of radiation in infrared and visible red light. The green areas from 2018 are now streaked with dark brown patches in 2019 (in the middle of the image), as caused by the defoliation of the forest.



Brazen, cynical, ineffective

A climate package was approved by the Federal Cabinet in October. The climate protection programme describes how Germany intends to meet its climate goals by 2030, and the Climate Change Bill specifies how measures are to be taken and monitored to combat global warming. Sociology student and »Students for Future« activist Julia Kaiser has studied the bill and believes the climate package will not protect the climate, but rather the profits of major corporations.

COMMENTARY: JULIA KAISER

It has become common knowledge that radical changes are required in our global production practices and lifestyles if we want to stop climate change. With this in mind, I can only describe the climate package adopted by the German government as audacious and perhaps even cynical. But it does not surprise me in the slightest.

None of the sixty-plus measures contained in the climate protection programme will reduce CO₂ emissions, because they fail to rein in the actual culprits: major corporations. Instead, the climate package aims to bring about changes in individual consumption habits, such as with CO₂ pricing, putting the costs and responsibility for climate protection on the shoulders of the working population. But climate protection is not an individual concern; it is a political issue.

In Germany, coal-fired power plants alone produce 229.2 million tons of CO₂, equating to a quarter of the country's total CO₂ emissions. However, the German government has not even decided to shut down the 20 most polluting power stations. The automotive, agricultural and chemical industries can also stick with their climate-damaging production methods. This is simply disastrous because according to the German business newspaper, »Handelsblatt«, the 30 largest DAX companies are single-handedly responsible for almost 40% of the country's CO₂ emissions. Any effective measures would have to hurt the business interests of these international corporations.

Do we have any reason to hope that our policymakers will one fine day oppose

such profit interests? Like Greta Thunberg, I think it would be disastrous to expect such a thing. I believe they will continue to ignore us—just like they have spent decades ignoring thousands of scientific studies, insights, and proposals on climate change. The reason for their failure is not that they do not understand the global situation or because they do not care about future generations; they are simply playing »climate politics« without restricting major corporations through actual regulations. That is not the way to ensure effective climate protection! If we want the 20 most polluting coal-fired power plants to be shut down as quickly as possible, if we want the public transport system to be massively expanded and made more affordable, and if we want to stop subsidizing air travel, we will have to fight for regulations that combat the pursuit of profit at the expense of people and the planet. We have to fight for a world in which this concept is no longer the structuring principle of society.

The protests held by schoolchildren and university students are an important start if we are to develop a strong movement against the prevailing politics, but activists will only succeed if they are joined by other parts of society to extend the reach of the climate movement. This is the only way to create a form of protest that could cause real economic damage—strike action. Global solutions to the climate crisis will only stand a chance if trade unions, environmental activists, and researchers work together. At »Students for Future«, we are doing our part to build this alliance. ■



Julia Kaiser (25) studies Sociology at the University of Jena. She is involved in the »Students for Future« movement. She helped organize the »Climate Strike Week« and was involved in the »Public Climate Schools« (p. 32) in November. She strongly believes that climate change should always be considered alongside social issues.

How can we save the climate?

A week of climate education for everyone! This was the idea at the heart of the »Public Climate School« initiative in November 2019, when »Students for Future« organized lectures, workshops, and debates on climate change for the general public throughout Germany. The students wanted to show that climate-friendly action requires commitment and expertise from various disciplines. The climate strike week was widely supported by all faculties at the Friedrich Schiller University Jena. We asked around what the speakers at Jena's »Public Climate School« had to say.

SURVEY: TILL BAYER



»CO₂ is an essential trace gas—it can't be harmful!« This is a classic argument used by climate crisis deniers that completely disregards any further consequences. CO₂ may well be beneficial for plants and heat up the atmosphere at the same time. Climate sceptics don't consider the next step either: Additional CO₂ is absolutely useless to plants if the ground they grow on is becoming barren and overheated.«

Robert Pauli

The climate activist from »Fridays for Future« held a workshop to present and refute some of the common arguments used by climate crisis deniers.



»Plants are particularly sensitive to climate change; they are developing strategies to adapt to the changing conditions. This can also be observed in local ecosystems, where many plants are flowering earlier and earlier, thus increasing the risk of frost damage and keeping away important pollinators. These shifts are leading to changes in plant species composition and, eventually, to changes in biodiversity.«

Prof. Dr. Christine Römermann

The ecologist and her team are investigating the effects of climate change on plant biodiversity.



The overuse of global resources, such as forests and oceans, will soon push the planet to its limits. We cannot continue like this. While economic expert Andreas Freytag calls for »economic incentives in the form of certificates to promote climate-friendly actions«, sociologist Hartmut Rosa sees things differently: »We have to overcome our obsession with growth—we need a change of mentality!«

Prof. Dr. Andreas Freytag (left) and Prof. Dr. Hartmut Rosa

The economist and sociologist held a debate on how to adequately tackle the global dimensions of the climate crisis.



»Climate change is a crisis that is challenging the international order and the stability of our national political systems. Countries are in a race against time, and their potential actions are being whittled down to a standstill. However, the crisis might also present an opportunity: Inflexible structures will become less rigid, making room for potential actions which may be considered impossible today but promise a comprehensive solution to the problem in the future.«

Sven Morgen

The political scientist held a seminar on the concept of crisis in the context of climate change and (foreign) policy.

»If we want to stop harming the climate, we might have to give up some of our habits. But are we morally obliged to curb our consumption? When it comes to the human right of self-preservation, climate ethics demand a contribution from all people, but particularly from states. In accordance with the principle of distributive justice, this contribution depends on each state's power and responsibility for global warming.«

Prof. Dr Andrea Esser

The philosopher held a public lecture titled »...and the devil may care? What do climate ethics demand?«



»The agricultural industry provides us with food, but nature is dwindling in the face of monocultures and factory farming, which are creating purely functional landscapes. It is high time to change our interaction with the environment. A sustainable change in our diets would protect biological diversity and slow down climate change.«

Prof. Dr Friedemann Schmoll

The cultural scientist held a discussion on our food and where it comes from.



»For 200 years, there have been simple yet compelling physical arguments for the existence of the greenhouse effect and therefore for the risk of global warming if the concentration of greenhouse gases increases. The crucial correlations behind rising global temperatures can even be illustrated with a simple formula*.«

Prof. Dr Gerhard G. Paulus

In his lecture, the physicist presented models that can be used to calculate the earth's temperature.

*** Formula to calculate the earth's temperature:**

$$T_{\text{Earth}} = 0.048 \cdot \sqrt[4]{\frac{1-\rho}{1-\beta/2}} \cdot T_{\text{Sun}}$$

T_{Earth} is the earth's temperature, i.e. the sought value, measured in Kelvin (°C plus 273). T_{Sun} is the sun's temperature (5,800 Kelvin). ρ is the albedo, i.e. the proportion of sunlight that hits the earth and is not absorbed, but reflected (= 0.3). β is the proportion of heat that is radiated by the earth's surface and absorbed by the atmosphere. β is currently 0.78. For these values, we obtain an average temperature of $T_{\text{Earth}} = 288$ Kelvin (15°C). However, β increases in line with the concentration of greenhouse gases: When β is 0.79, the temperature is 0.5 °C higher.



ISBN 978-3-18-29862-6

Crisis debate

Democracy is in crisis. Fundamental upheavals in the economy, environment, and society illustrate that our current growth dynamics are no longer a stabilizing element of society, but another driver of crisis.

This volume has been edited by Hanna Ketterer and Dr Karina Becker, sociologists from the University of Jena. Researchers discuss the impact of the currently perceived crisis on the future of our democracy and the conceivable paths towards democratic transformation. However, one of the featured authors, Prof. Dr Klaus Dörre (p. 12), does not believe our democracy—or capitalism—is in crisis. US



ISBN 978-3-658-25946-4

Decontaminating the concept of home

In the age of globalization, we have the opportunity to redefine the concept of »homeland« and combat its nationalist appropriation

In 1970, Günter Grass insisted that we must not surrender the concept of »homeland« to the demagogues. The author of »The Tin Drum« showed incredible foresight, as a war has been raging in recent years over the interpretation of the word »homeland«. Klaus Ries, a historian at the University of Jena, describes the term as vague, flexible, and pluralistic—a concept in a state of flux«. In the age of globalization, we have the opportunity to redefine the concept of »homeland«, giving new meaning to a oncecontaminated idea. Jena-based novelist Edoardo Costadura adds that the idea of »homeland« is



ISBN 978-3-8376-4588-0

being put to the test by events like the refugee crisis of 2015: »Are refugees able to find a new homeland? What processes take place?« Klaus Ries and Edoarda Costadura worked with Christiane Wiesenfeldt (Institute of Musicology Weimar-Jena) on the book »Heimat global. Modelle, Praxen und Medien der Heimatkonstruktion« (»Global Home. Models, Practices and Media in the Construction of Homeland«), which offers historical accounts and current reflections on the concept of »homeland«. Sociologist Hartmut Rosa offers one possible interpretation: Home emerges wherever I feel received as a person, where I learn to accept and I am accepted myself. Home cannot be reduced to a mere term, as reflected by the underlying theme of a conference where historians, theologians, political scientists, sociologists, jurists, musicologists, and creative artists exchanged their views at the Friedrich Schiller University. Edoardo Costadura speaks of a laboratory in the sense that home should be understood in the most progressive and enlightening manner as an open and integrative social project. Costadura argues that globalization plays a key role here: »It gives us the opportunity to redefine the concept of »homeland« without restricting ourselves to a nationalist point of view«. sl

Post-growth societies

In September 2019, the Berlin Journal of Sociology published a special volume on the occasion of the closing conference of the »Post-Growth Societies« research group at the University of Jena. The volume summarizes the topics and theories of the research group, which received funding since 2011, and addresses some of the major insights gained over the past eight years.

It includes the group's hypothesis that times of growth are over for countries in the Global North. The volume also addresses the future of the welfare state and democracy, and it looks at the forces and trajectories of social change. The latter is discussed using examples like right-wing populism and the degrowth movement. US

Phone calls for research

If the general election were held this Sunday, which party would you vote for? Where do you stand on the expansion of wind power? How do you invest your savings? The aim of empirical social research is to find out what people think about current affairs and how they form their opinion. But how do researchers get hold of this often extremely private information? Most of the time, they just get on the phone.

BY SEBASTIAN HOLLSTEIN

»Good evening. We're carrying out a study. Do you have time to help?« This is how pollsters tend to start their calls to collect data, which they usually do in the evening. Telephone surveys are essential for sociologists, as they provide the basic data required for empirical social research. Over the past 15 years, the Friedrich Schiller University Jena has been running its own laboratory for computer-assisted telephone interviewing (CATI). Up to 20 student assistants can be on the blower at the same time in the two rooms, making calls in the name of research.

»Our surveys are often part of larger research projects,« explains Thomas Ritter, the head of the institution. »Our most elaborate project is definitely the Thuringia Monitor, which maps the political views of the people of Thuringia each year, and for which we conduct over a thousand interviews.«

Dialled numbers from randomly generated samples

The CATI laboratory is not only used by researchers in the field of social sciences, but also in economics and communications research. Thomas Ritter and his colleagues not only provide the infrastructure; they also give advice on the feasibility of projects. »We bridge the gap between theory and practice: I calculate the approximate expenditure and time required, and I also offer tips on the structure of surveys,« says Ritter. In addition to research projects, the telephone laboratory is also used intensively in teaching. Students often develop their own empirical research questions in seminars, designing a survey and eventually picking up the phone themselves.



Students at the CATI laboratory interview study participants on the phone.

Whether for a research project or seminar work, an interview always starts with a telephone number. But how do interviewers decide who to call? »They don't,« says Thomas Ritter. Instead, researchers obtain numbers from GESIS – Leibniz Institute for the Social Sciences, which acts as a kind of service provider for research projects in the field of social sciences. GESIS in turn obtains the numbers from the Federal Network Agency and randomly generates samples for the interview laboratory. »We only find out who the numbers belong to when we dial them,« says Thomas Ritter. But first they have to pick up. After all, not everyone who is called takes part in the survey. »An interviewer will typically dial around 100 numbers every five hours, which results in about five interviews, during which the pre-set survey is displayed on their moni-

tor,« says Ritter. Institutions like the CATI laboratory are facing a growing problem that is making surveys significantly more difficult: »There are fewer and fewer landlines these days. Young people in particular only use mobile phones and are more difficult to contact. It also makes it harder to conduct surveys for one specific region, such as in the case of the Thuringia Monitor,« explains Ritter.

These are just some of the reasons why the CATI laboratory needs a technical revamp in the near future to make it more modern. Another essential ingredient for the laboratory's success are the student assistants, most of whom study a subject related to social sciences and therefore know exactly what is required of them. Thomas Ritter has no worries about finding young talent. »We always welcome applications.« ■

»Leafclips« are used by the students Valentin Kurbel (left) and Hossain Mohammad to measure the vitality of the trees planted in the former mining area.



Life in a mining desert

Around 40 kilometres to the east of Jena, on a meadow near Ronneburg, tiny organisms are fighting a huge environmental issue. Not a single blade of grass grew here for many years, as the soil had been contaminated by toxic metals—the sad legacy of a GDR uranium mine—but researchers from the University of Jena are helping nature back to its feet. They are using bacteria and fungi to enable the sustainable use of the area. Our author met with the researchers at the test field on the former heap leaching site.

BY TILL BAYER

It is around 11 o'clock on an autumnal Wednesday morning. I make a hesitant stride onto the narrow strip of dead earth that stretches out before me. There are no signs of life on the reddish brown soil, which is littered with pebbles. No blade of grass, not a single leaf, not a tiny bit of green. I am in a place near the town of Ronneburg in eastern Thuringia, where until a few decades ago, a huge mining heap soared into the sky. This is where the ore of Europe's largest uranium reserve was mined, from which the Soviet Union produced nuclear weapons. »No plants can grow in this section,« says Prof. Dr Erika

Kothe, who is standing next to me in her yellow wellington boots. »The water in the subsoil is too heavily contaminated with heavy metals«. In the areas where miners used to work up to 1990, the microbiologist is now directing a research project for the University of Jena to revitalize the soil on the former spoil heaps. How can microbiology, of all sciences, help the situation?

Our journey begins at 8 o'clock in the morning outside a public park in Jena, where Erika Kothe is waiting for her team, which includes biologists, geoscientists, and students. Around twenty people in five cars, which are full to

the brim with measuring equipment, plastic containers, and tools to be used throughout the day. Nobody is bothered when the rain starts to fall—everyone is wearing waterproofs and wellington boots.

And then our convoy sets off towards Winzerla via Rudolstädter Strasse before heading onto the A4 motorway towards Gera. Kothe doesn't need a navigation device—she has driven along this route many times since the research project was launched in 2004. As her estate car cruises along the motorway, she tells me about the background to the project: In the days of the

First picture: The research team has installed an automatic weather station on the »Gessenwiese« meadow near Ronneburg to measure meteorological data, such as wind, precipitation, and temperature.

Second picture: Sarah Bhutta, De Sayantan and Franziska Zimmermann (left to right) determine the pH value and conductivity of soil samples.

Third picture: The three students had previously dug out a profile to collect the soil samples.



GDR, several thousand tons of uranium ore were mined by the »Soviet-East German stock company Wismut« in the area around Ronneburg. Some of the low-grade ore was stored on enormous overground heaps. Sulphuric acid was added to mobilize the uranium. However, this process also released other heavy metals from the rock, such as iron and manganese, which seeped into the ground with the acid as waste products. The soil is still contaminated with metals to this day. They can end up in the groundwater, causing plants to grow poorly in the former mining areas. Another problem: The dead earth is exposed to the wind and rain, which could spread the contaminants even further into the surrounding area.



Landfarming on formerly contaminated soil

This is what the Jena-based researchers aim to prevent through the USER project. The German acronym stands for heavy metal landfarming for sustainable landscaping and the production of renewable energy in areas contaminated with radionuclides. Contaminated with radionuclides? Is the area still loaded with radioactive waste? »Ever since the area was completely redeveloped by Wismut GmbH after the mine had been closed, the levels of radioactivity have been minimal,« assures Kothe. At most, small amounts of radon are released like in other places with a similar geological subsoil, but the radiation dose is not harmful. »It might put your cells under a little stress, but that actually can help prevent rheumatism and arthritis—like a radon spa«.





I am not exactly relieved by her answer. I try to relax and notice that we have already left the A4 motorway. As the roads get narrower, we turn onto a dirt track before coming to a halt in a meadow. We get out and hobble over a thin wooden footbridge that leads over a ditch and onto the »Gessenwiese«. The research enclosure is around half the size of a football pitch. The others have got there before us—some of the researchers have already started their work. I notice a tidy row of young trees at the other end of the enclosure. »That's our test field«, explains Kothe with pride. »Some of the trees are already six metres tall—and we only planted them three years ago«.

They are growing in an area that used to be one of the largest spoil heaps in Europe, where ore was piled up to 45 metres high and leached with sulphuric acid, so that the metals could be collected in a solution at the foot of the heap. I take a closer look at the trees. Some of the alders, birches, and willows are bigger than the others; the alder trees are the tallest of the lot. That's because the trees have been planted in soils with various types of biological and geological additives.

Microorganisms protect the trees against metals

For example, the researchers have added microorganisms to the soil, which protect the trees and other plants against toxic metals. Mycorrhizal fungi are also being used. They create a mutually symbiotic relationship with their host trees by supplying water and nutrients from the soil and receiving photosynthesis products in return. Grasses like red fescue are also helping to protect the trees against erosion; and the carbonate-rich soil added from sources around Jena acts as a buffer to the acidic substrate present. Kothe disappears for a moment amongst the trees and returns with a small piece of root. She hands me the delicate structure. As I take a closer look, I see tiny bulges. »That's another form of mutual symbiosis, this time between certain bacteria and alder roots,« says the professor.

»The bacteria even ensure the supply of nitrogen to the tree, because they trap atmospheric nitrogen and thus reduce the need for fertilizer«. The researchers are using methods like these to find the combination of soil improvements, plants, fungi, and bacteria that can most

effectively promote plant growth in the low-nutrient soil. This will allow the researchers to grow a plantation in the former mining area, which will ultimately provide the wood needed to generate renewable energy.

As the success of such a project is dependent on long-term documentation, the team has installed several measuring stations called »lysimeters« on site. Dr Daniel Mirgorodsky shows me what this is all about. The geologist opens a circular hatch in the ground, not much bigger than a manhole cover, and we climb into the darkness below. At a depth of around two metres, a musty smell hits my nostrils—we are standing in a damp cellar with three metal tanks. That must be the lysimeters. »These tanks are on scales,« says Mirgorodsky. He is standing right in front of me—the cellar is just big enough for two people. »That is how we measure how much rain falls on the area and how quickly the water evaporates. Other measuring devices determine the metal content of the leachate that could potentially seep through the soil and into the groundwater«.

I suddenly hear a beep coming from a box with green and red flashing lights

The area where the researchers are now planting trees looked a lot different in the 1990s (picture left and right). The conical spoil heaps and the open pit were left over from the former uranium mining industry near Ronneburg in eastern Thuringia.

on my left. I am looking at the radio station that transmits readings to the laboratories in Jena every 15 minutes. »You can't just plant trees in this soil,« adds Mirgorodsky. »We have to check which plants can grow in which condition, and which combination of bacteria and fungi are capable of optimally supporting their growth—out in the field and in the laboratory«.

Many tests, one objective: to develop the best method for growth

I say goodbye and climb outside, where the students have started their work in groups of three and four. I want to take a closer look at their different experiments; after all, they too are involved in the long-term observation of the research area. I start off at the plantation with the alders, birches and willows, where one of the groups is roaming through the densely vegetated area. The student at the front is carefully attaching clips to the green leaves of the trees, almost like she is decorating a Christmas tree. She is being followed closely by two other students, who are holding a measuring device against the clips, reading off values and entering them in a table. »This is how we measure the fluorescence,« explains the biologist Markus Riefenstahl, who is supervising the group.







Picture far left: Dr Daniel Mirgorodsky climbs into a lysimeter through a hatch in the ground. The geologist uses this underground system to monitor the transfer of substances between the atmosphere, soil, and groundwater.

Picture at the top: Dr Arno Märten (left) and Jonas Ruppert take water samples for their hydrochemical analysis.

Picture left: Various fieldwork and sampling tools are used during the annual field practical courses within the research project.

Picture above: The researchers use titration to measure soil respiration, i.e. the intake of oxygen or release of carbon dioxide by microorganisms and roots in one area.



Good knowledge of species is required here: Odejide Tosin, a student on the international, English-language master's programme in Microbiology, identifies all the plants in a defined test area.

»We do this to check how well photosynthesis is working and determine how much stress the trees are under due to the soil contamination.« As I walk away from the plantation, I bump into another group that has gathered around one of the many pipes that are sticking out of the ground throughout the site. Dr Arno Märten is responsible here. »This pipe is a groundwater measuring station, where we monitor the groundwater table before conducting hydrochemical analysis in the lab,« explains the geologist. A student drops a water level meter into the pipe, which measures the depth as soon as it touches the water. He then uses a scoop pipe to collect a sample. Märten is happy with the water quality—the effects of the former spoil heaps are gradually wearing off. However, climate change is beginning to rear its ugly head: As a result of the extremely dry spells over the past two summers, several measuring stations are currently without any water whatsoever.

I walk past a pair of white tents in which researchers are setting up equipment for an experiment and head over

to the next group of students, who are in the middle of some strenuous-looking work. They are swinging around pickaxes and spades to dig a hole measuring around two metres in width. I take a look inside and discover various layers of soil in different colours: red and black strips sandwiched between sandy layers. The heavy metal contamination can be seen with the naked eye here: The red stuff is iron hydroxide (rust); the black colour is caused by manganese hydroxide. »These hydroxides lead to a build-up of rare earth elements,« explains Erika Kothe. »This area is ranked behind China as the place with the third highest concentration of rare earth elements in the water worldwide.«

Measuring soil respiration with jam jars

Now the microbiologist wants to show me the other test field. We get in the car and drive through a few villages and past a huge former heap site on our way to the Kanigsberg mining area. The

researchers have set up another white tent here, where students are busy analysing the soil respiration. They are sitting patiently in front of their titration apparatuses and shaking tubes containing a pink solution, adding drops of diluted hydrochloric acid. The striking colour comes from phenolphthalein, an indicator used to visualize the change in the pH value in an alkaline solution that has been covered with a jam jar and left on the soil overnight. For every sample, they note how much acid is required until the pink solution turns colourless. This allows the researchers to establish how much carbonic acid has been produced during microbiological respiration in the form of CO₂.

Kanigsberg is also home to the strip of dead earth where no plant grows. This situation is caused by a small spring on the slope; the water suppresses plant growth. As we pass through the area, I notice it is much more reminiscent of the mining industry than the Gessenwiese. The reddish brown tinge to the soil is more intense, and I even discover a black lump of ore among the many pebbles. And as we stand before



Lisa Schulz (left), a bachelor's student in Biogeosciences, and Prof. Erika Kothe discuss the samples that are titrated to measure soil respiration. The phenolphthalein dye turns from pink to colourless when the pH becomes neutral. This is how the researchers can measure how much CO₂ the microorganisms have produced.

the test field, I can see the effects: The trees here are much smaller than in the first field—despite being the same age. The alder trees are still the tallest, but the highest growth performance is measured for pines and birches. This is mainly because of the different, more gravelly soil, but the light conditions and proximity to other plants can also play a role.

Aerial observation and other upcoming measures

All of a sudden, the rain comes pouring down. »That means it's time for a lunch break,« announces Kothe with a wink.

On the benches in the tent, everyone huddles together to eat a slice of apple cake brought along by the professor—she is clearly happy with her team's performance. »Everyone pulls together here, whether they are a biologist or a geologist,« she says. This bodes well for the future of the project, which will run for a few more years.

The researchers want to continue looking for the best combination of gentle and environmentally friendly methods; and they are looking to introduce additional measures to the project. They also plan to observe the area from the air using automated drones; and they are testing another analytical method which, in addition to plant growth, can

measure soil formation and any changes caused by erosion. Furthermore, the geologist involved in the project, Prof. Dr Thorsten Schäfer, wants to conduct more detailed analyses of the transport of bacteria and metals as nanoparticles in the water.

We leave around 13:30. Before I get back into Erika Kothe's car, I take another look at the place. I am amazed that trees have started growing in such a short space of time in an area which, in old pictures, looks like a rugged lunar landscape.

Perhaps this might also work one day along the strip of dead earth—if necessary, it can always get a little kick-start from the world of science. ■

Further information on study programmes related to the research project at the Friedrich Schiller University Jena:
BSc and MSc in »Biogeosciences« and
MSc in »Microbiology«

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European earthworm diversity

There are generally more earthworms in locations of temperate latitude than in tropical locations of the same size; and climate change could change where earthworms are found and alter their role in ecosystems around the world. This was the conclusion of a study conducted by the German Centre for Integrative Biodiversity Research (iDiv). The researchers worked with 140 scientists from around the world, including Prof. Dr Ulrich Brose and Prof. Dr Birgitta König-Ries from Jena, to compile the world's largest earthworm database, containing information from 6,928 locations in 57 countries (DOI: 10.1126/science.aax4851). Earthworms make nutrients available, store climate-changing carbon, and spread seeds, but little was known about their global distribution until now. VH



As hot as the sun's core

The conventional states of matter—solid, liquid, and gas—are joined by another state: plasma. While over 99% of all matter in the universe is in this state, for example inside stars, creating a plasma on Earth is anything but simple. However, physicists working with Dr Zhanna Samsonova and Dr Daniil Kartashov (pictured above) have developed a method to create plasma for a few picoseconds in the lab (DOI: 10.1103/PhysRevX.9.021029). The researchers at the Institute for Optics and Quantum Electronics use extremely fine silicon wires that are heated with pulsed laser light. The wires are just a few hundred nanometres in diameter, which is smaller than the wavelength of the laser. This minimizes disruptive mirror effects, which are some of the main obstacles in the production of plasma. sh



Inclusion goals yet to be reached

The German education system and its actors continue to struggle with the issue of inclusion. Under the direction of Prof. Dr Bärbel Kracke (pictured above), education scientists at the Friedrich Schiller University and the Humboldt University of Berlin have examined how the city of Jena and its schools are addressing the inclusion of students with special educational needs.

In their recently published volume, the authors demonstrate that not all schools are focusing on inclusion, but that some institutions are especially committed to the issue (ISBN 978-3-8309-3991-7). For example, comprehensive schools in Thuringia are particularly important for students with learning difficulties, whereas grammar schools often still dismiss inclusion. sh



Fewer worries with a helmet

A bike helmet suggests safety—even when the person wearing one is not on the saddle. This discovery was made by a team of Jena-based psychologists directed by Dr Barbara Schmidt (pictured above) in cooperation with the University of Victoria in Canada (DOI: 10.1111/psyp.13458). The research team conducted an experiment in which they asked a group of people to play a gambling card game on the computer. They could choose between a high-risk and low-risk option. Half of the participants were wearing a bike helmet. The scientists used EEG to measure participants' brain activity and discovered that wearing a bike helmet reduces cognitive control: The brain activity that characterizes the weighing up of alternatives in the decision-making process proved to be much lower than in the test subjects without a helmet. sh



Marine antibiotics

Almost three quarters of all antibiotics with clinically relevant antibiotics are natural substances, produced by bacteria. However, the antibiotics that are currently available are becoming less effective, as more and more pathogens are becoming resistant to them. In other words, there is an urgent need for new antibiotics, but less than 1% of the known bacteria types are of use in the search for active ingredients; the remaining 99% are »non-culturable«. Prof. Dr Christian Jogler and his team of researchers at the Institute of Microbiology have managed to cultivate and functionally characterize dozens of previously overlooked marine bacteria in the laboratory to make them available for systematic screening for active ingredients (DOI: 10.1038/s41564-019-0588-1). Their initial analysis indicates potential for the production of new antibiotics. US



Algorithm learns with pictures of birds

One of the major challenges facing artificial intelligence (AI) is the ability to identify and distinguish between objects that only differ in a few minor details. Humans are already being supported by computer systems with this capability in many areas of modern life. For example, these systems can make life easier for biologists by automatically identifying animal and plant species. Prof. Dr Joachim Denzler and his team of computer scientists in Jena have now developed an algorithm for so-called »fine-grained object recognition«. Their chosen training platform was also inspired by nature: an international database containing 200 bird species from North America. This method has a recognition rate of around 90%. The algorithm can be used by anyone interested: <https://birds.inf-cv.uni-jena.de>. sh



Oman hit by tsunami 1,000 years ago

Around 1,000 years ago, the coastline of the modern-day Sultanate of Oman was battered by 15-metre-high waves in a violent tsunami that pushed 100-ton boulders into the inland. This was found by a study carried out by the Universities of Bonn, Jena, Freiburg and the RWTH Aachen (DOI: 10.1016/j.margeo.2019.106068). The results also show how desperately the region needs an effective early warning system. But even then, coastal residents would only have 30 minutes at most to get to safety in the event of a similar disaster.

Dr Christoph Grützner (pictured above, on the left) from the Institute of Geosciences is a member of the research team. For the study, he measured the geological layers in the huge blocks that were shifted by the tsunami. AB



Smartphone as a personal dietician

Under the direction of Prof. Dr Stefan Lorkowski, the Cluster of Excellence for Nutrition and Cardiovascular Health (nutriCARD) at the universities of Halle, Jena and Leipzig has developed a smartphone app to evaluate the nutritional value of processed food. The nutriCARD app is based on the »Nutri-Score« and provides data on the content, nutritional values, and questionable ingredients of food like biscuits, ready meals, and fizzy drinks. This information is processed using a database of the food-stuffs available in Germany, which currently contains around 300,000 products and 33,000 ingredients. The free app can be downloaded from the Apple App Store (»nutriCARD—gesünder essen«). An Android version is in the pipeline and will be released soon. More information: <http://nutricard.baggid.com>. US

Hostile takeover in the ocean

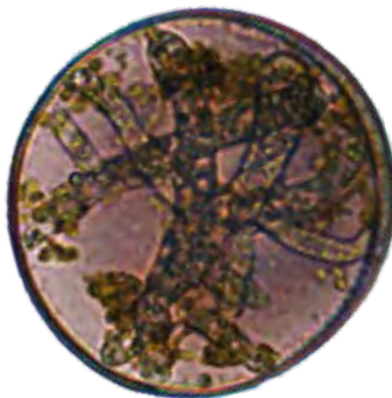
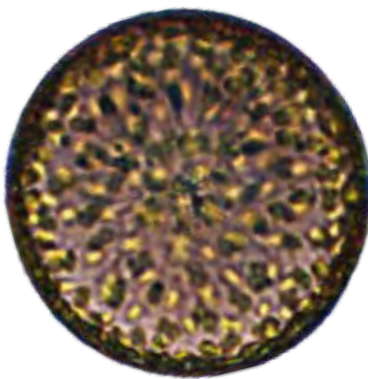
Oomycetes, also known as egg fungi, are known to cause serious diseases in plants and animals. They also affect algae, which tend to succumb to the infection. A team of researchers from Jena and Frankfurt/Main have managed to shed light on the biochemical fungal attack and how exactly the fungi kill the algae.

BY ANGELA OVERMEYER

Whenever the sea suddenly turns blood-red or lights up in bright shades of green or brown, the cause is usually algae. We can often observe a mass proliferation of algae in the oceans, but such algal blooms attract other organisms that stop the growth of algae and sometimes even bring about the end of an entire algae population. The exact details of this process were previously unclear.

Algal metabolism attacked and reprogrammed by fungus

In a collaborative study conducted by researchers at the Max Planck Institute for Chemical Ecology in Jena, the Friedrich Schiller University, and the Goethe University in Frankfurt/Main, the underlying mechanisms of algal death have been investigated. They have shown that a pathogenic fungus alters the metabolism of its host unicellular alga and changes it for its own purposes. It makes the algae produce bioactive substances that benefit its own propagation, while preventing algal proliferation. Ultimately, the algae are killed and parasites can thus contribute



to the termination of the bloom. For the study, the team established a laboratory system, in which a marine diatom was infected by the pathogenic oomycete *Lagenisma coscinodisci* under controlled conditions. This parasite is known to infest unicellular algae and prevent them from proliferating.

The researchers examined the metabolism of the algae during the infection process. They found that all infected algae began to generate two chemical substances that they do not normally produce: »carboline« from the class of substances known as alkaloids, which also include nicotine and caffeine. »We were surprised by the presence of these carbolines. Their formation was completely unknown in diatoms, but they

Healthy diatom (above) and infected diatom (below): The parasitic oomycete *Lagenisma coscinodisci* sucks all nutrients from the infected cell and manipulates the algal metabolism to form its own form of reproduction—a sporangium.

were formed by all algal cells during the oomycete infestation,« explains Marine Vallet, one of the two main authors of the new study. Interestingly, both of these substances only benefited the oomycete; they damaged the algae and ultimately killed it.

Active chemical compounds identified

This study was challenging because the parasites usually kill their host in a very short time and the substances are produced in very low amount in the small cells. The other main author, Tim Baumeister, describes some of the challenges that had to be overcome at the be-

ginning of the project: »Oomycetes are known to take various forms: They are often only found as tiny spores in their host, and they sometimes do no harm at all and simply ›sleep‹ in their host. At other occasions they can cause massive killing of the algae. These processes result in a highly dynamic fluctuation of dominant species in the ocean«.

Using high-resolution spectrometric methods combined with microscopic techniques, the scientists were able to identify the active chemical compounds produced by a single algal cell. »One has to bear in mind that a single cell is 30 times smaller than a pinhead and that the concentration of all substances is very low. Shedding light on the chemistry occurring in a single cell is a major

technical achievement,« explains Georg Pohnert. The professor of Instrumental Analytics at the University of Jena directs the Max Planck Fellow Group »Interaction in Plankton Communities«.

The scientists would now like to conduct further studies to find out how the diatoms are able to defend themselves against this pathogenic fungal attack, because they are aware that not all diatom species are equally susceptible to hostile infestation by parasitic oomycetes. However, diatoms and their various interactions with their environment continue to present researchers with numerous questions. »The sea is a treasure that needs to be protected. There are still many fantastic discoveries to be made,« concludes Marine Vallet. ■

Original publication:

The oomycete *Lagenisma coscinodisci* hijacks host alkaloid synthesis during infection [...]. *Nature Communications* (2019).
DOI:10.1038/s41467-019-12908-w

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Arguably the smallest bar magnets in the world

Most of us probably know magnets as the colourful badges that we stick on our fridge door, as the buttons on our handbag, or as moveable compass needles. However, numerous electrical devices—from the telephone to the particle accelerator—only function thanks to their electromagnetic components. Chemists at the University of Jena are investigating a special type of magnets—they are meticulously working on magnetic polymers that could be used to store large volumes of data.

BY MARCO KÖRNER

Dr Michael Böhme is using computational chemistry to work on molecular chains that behave like tiny magnets. The chemist describes the object of his research: »These are polymers in which a large amount of magnetic metal ions, such as cobalt, are lined up like a pearl necklace«. The individual metal centres form their own magnetic domains, which can store magnetic information. If, at some point in the future, we want to use these magnetic molecules as data storage systems, we have to exactly understand and predict their properties, which is technically infeasible at the moment. »These systems are highly complex,« explains Böhme. The chains are not infinitely long in reality, which means their ends also affect the properties. »And the metal centres are not identically structured. The order in which they are arranged also has an effect on the magnetism that we can ultimately observe in the experiment«. This puts to the test all previous theoretical models that researchers have used to interpret and predict the properties of the tiny »bar magnets«.

Therefore, Böhme is simplifying his calculations by firstly looking at molecular rings of various sizes instead of an endless chain of molecules. He has been working with Prof. Dr Winfried Plass from the Institute of Inorganic

and Analytical Chemistry at the University of Jena to develop a computer model that can be used to better interpret the experimental data of the real molecules and predict their magnetic properties with greater accuracy.

A 100-year-old model is still used for research today

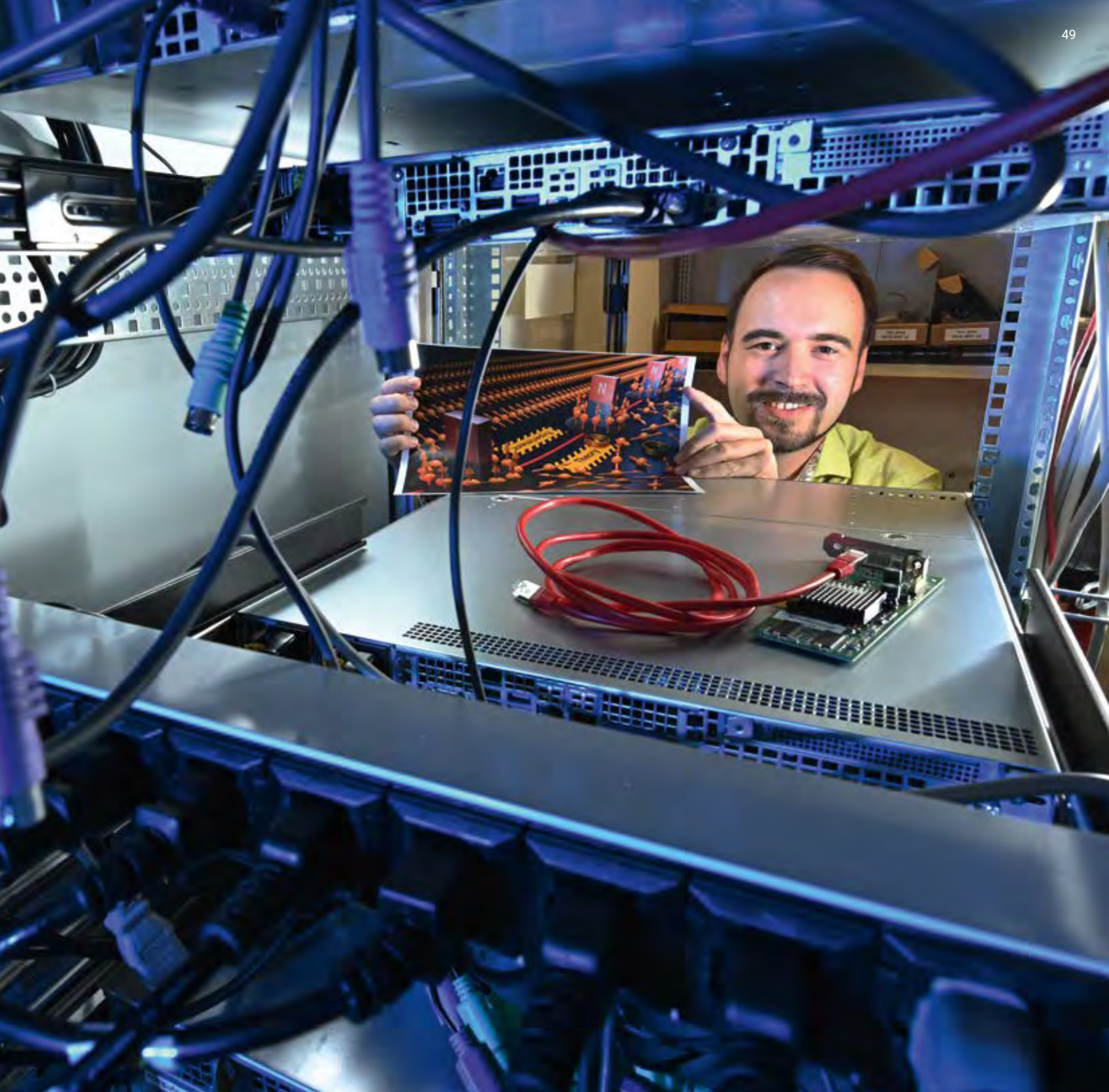
Until then, however, there is another problem to be solved: »The computers at our disposal are not powerful enough to calculate the properties of long chains. They need around one week to carry out ab initio calculations for one single metal centre. It simply isn't feasible to calculate a complete domain from several centres with the current technology,« explains Prof. Plass. The »Ising model« was developed way back in the 1920s to study magnetic molecular chains in a highly simplified manner. »The Ising model has essentially been used for a hundred years,« says Plass.

Michael Böhme has now developed a less idealized model on the basis of ab initio calculations, which is closer to reality than the Ising model. »In addition to the actual metal centres, the links that facilitate interaction between the magnetic centres are also important,«



explains Böhme. »We can obtain this information by adapting the theoretical model to the actual measurement data, which ultimately enables us to calculate the domain properties. This also allows us to make predictions as to the behaviour of previously unknown single-chain magnets«.

Instead of calculating an endless chain, Böhme has applied his model to rings with three, six, nine, and twelve members. »Twelve is the highest possible amount for us, because there are 4,096 possible states that have to be calculated,« explains Michael Böhme. »However, we can then extrapolate this data



to accurately predict the properties of longer chains».

Winfried Plass highlights some of the potential future applications: »Magnetic materials are highly suitable for

storing information. Individual magnetic molecules can store much more information than the current storage media, where individual areas are magnetized«.

Dr Michael Böhme is a chemist who has developed a theoretical approach to predict the magnetic properties of single-chain magnets with greater accuracy.



Original publication:

How to link theory and experiment for single-chain magnets beyond the Ising model [...] *Chemical Science* (2019), DOI: 10.1039/C9SC02735A

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Distant worlds under many suns

Is the Earth the only habitable planet in the universe, or are there other places out there that are capable of supporting life? And if there are, what might they look like? In order to answer these fundamental questions, scientists are searching for exoplanets, i.e. planets outside our solar system that orbit other stars. A study by Dr Markus Mugrauer, astrophysicist at the University of Jena, shows that the Sun rises several times in many of these distant worlds.

BY TILL BAYER

More than 4,000 exoplanets have been found so far. Most of them orbit single stars, much like the Earth orbits our Sun. However, astrophysicist Dr Markus Mugrauer has now discovered numerous multiple star systems with exoplanets. In other words, these exoplanets orbit one of several »suns«.

Precise data supplied by the Gaia space observatory

»Multiple star systems are very common in our Milky Way,« explains Mugrauer. »If such systems include planets, they are of particular interest to astrophysicists, because their plane-

tary systems can differ from our solar system in fundamental ways«. To find out more about these differences, Mugrauer scanned more than 1,300 host stars—where exoplanets have been found—in search of companion stars. For this purpose, he accessed the precise observational data supplied by the Gaia space observatory, which is operated by the European Space Agency (photo on p. 5). In this way, he detected about 200 companion stars to exoplanet host stars that are up to 1,600 light years away from the Sun.

With the Gaia data, Mugrauer was able to characterize the newly discovered companion stars and their systems in detail. He found that there are both, close systems with separations

The closest exoplanet known, Proxima Centauri b, also belongs to a multiple star system. Artist's impression (ESO/M. Kornmesser)

of only 20 astronomical units (au)—which, in our solar system, roughly corresponds to the distance between the Sun and Uranus—as well as systems in which the stars are separated by more than 9,000 au.

The companion stars also vary in terms of their mass, temperature, and stage of evolution. The heaviest among them weigh 1.5 times more than our Sun, while the lightest have just under one tenth of our Sun's mass. Most of the companion stars are low-mass, cool dwarf stars that glow faintly red.

However, eight white dwarfs were also identified amongst the faint companions. A white dwarf is the burnt-out core of a sun-like star, which is only about as big as our Earth, but half as massive as our Sun. These observations show that exoplanets can indeed survive the final evolutionary stage of a nearby sun-like star.

Double, triple and quadruple star systems with exoplanets

While the majority of the star systems with exoplanets found in the study are double stars, Mugrauer also detected twelve hierarchical triple and even quadruple star systems. A total of 15% of the stars examined have at least one companion star. Mugrauer mentions one of the key findings of his work: »This is only about half the frequency expected in general for sun-like stars within that range of separation«. Furthermore, the companion stars detected show separations about five times wider than in ordinary systems. »These two findings together could indicate that multiple stars in a solar system influence the formation process of planets as well as their orbital evolution,« explains Mugrauer. This is firstly because of the gravitational interaction of the companion stars with the gas and dust discs in which planets are formed. Their gravitational then interferes with the movement of the planets around their host stars.

Markus Mugrauer would like to pursue the project to examine the multiplicity of newly discovered exoplanet host stars using data obtained from the Gaia mission and to precisely characterize the detected companion stars. »In addition, we will



These images show some of the exoplanet host stars with stellar companions (B, C) that Markus Mugrauer discovered. The pictures were taken by the Panoramic Survey Telescope and Rapid Response System (PanSTARRS) in Hawaii. The image in the middle shows a hierarchical triple star system.

combine our results with those of an international observing campaign, which we are currently running on the same topic at the Paranal Observatory of the European Southern Observatory in Chile,« adds the expert from Jena. »That will allow us to investigate the precise influence of the stellar multiplicity on the formation and evolution of planets.« ■

Original publication:

Search for stellar companions of exoplanet host stars by exploring the second ESA-Gaia data release. MNRAS (2019), DOI: 10.1093/mnras/stz2673

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Time travel through the evolution of plants

The result of a mammoth project: As part of the »One Thousand Plant Transcriptome Initiative«, all active genes of over 1,000 plants have been analysed with unprecedented accuracy over a period of nine years. The gigantic set of data can now be used to identify crucial stages of development in the plants' continuous evolution over more than a billion years.

BY UTE SCHÖNFELDER

How did terrestrial plants manage to leave their original habitat—the water—and grow ever taller on land, despite the Earth's gravity, and eventually produce flowers, seeds, and fruit? In order to answer such questions, around 200 scientists from more than 130 international research institutions have used immense computing technology to analyse all active genes—the transcriptome—of more than 1,000 green algae, mosses, club mosses, ferns, gym-

nosperms, and flowering plants. They have arranged the genes and gene families into phylogenetic trees, revealed family relationships within the plant kingdom, and published their results in the journal »Nature«. A research team from the Friedrich Schiller University Jena is among the authors. The duplication of genetic material has played an important role in the emergence of plant diversity and the development of new properties. In the study,

the geneticists Prof. Dr Günter Theißen and Dr Lydia Gramzow from the University of Jena examined the point of emergence and duplication of certain genes that are responsible for the development of flowers. These »MADS box genes« are found in all plant families, albeit in different frequencies. »The most primitive ancestors of modern-day plants were aquatic green algae,« explains Prof. Theißen. »They did not have any flowers or seeds and

View of the Botanical Garden at the University of Jena: All green plants living today can be traced back to a common ancestor that was already a green plant.





Dr Lydia Gramzow and Prof. Dr Günter Theißen from the Matthias Schleiden Institute at the Friedrich Schiller University are part of the international research consortium that has examined the evolution of plant diversity more extensively than ever before.

only a very small amount of MADS box genes«. Over the course of time, these ancestors have evolved into today's terrestrial plants, including mosses, ferns and seed plants. The growing diversity of plant species has also led to an increase in the number and variety of MADS box genes. As MADS box genes control important processes in the development of plants, there is a direct correlation between the number and diversity of these genes and the complexity and diversity of plant structures.

Expansive gene duplication

It has long been known that modern-day plants have different amounts of MADS box genes in their genetic material. While simple mosses or club mosses have fewer than 50 copies on average, 50 to 300 different MADS box genes can be found in the genome of more developed seed plants. »One might assume that gene duplication

is simply a result of the evolution of plants towards higher complexity,« says Dr Lydia Gramzow. However, the researcher examined almost 30,000 sequences during the latest study and was able to refute this assumption. »We have found the existence of MADS box genes to be the result of separate gene duplications,« says Gramzow. As reflected by the phylogenetic tree created by the researchers in Jena, MADS box genes (e.g. in ferns and seed plants) have multiplied and developed separately. »Both groups of plants have a common ancestor,« explains Prof. Theißen. From this, modern-day ferns have evolved along one line and seed plants have evolved along another. »MADS box genes have duplicated independently and with differing degrees of frequency along both lines. We suspect there were four different genes present in the last common ancestor of modern-day ferns and seed plants around 380 million years ago«. From their results, the geneticists conclude that similar processes may have

also occurred in other gene families. »This reveals that evolution is not necessarily a one-dimensional and linear process; the same stage of evolutionary complexity is sometimes reached in different ways,« concludes Prof. Theißen.

Less is sometimes more

The study also shows that evolution does not necessarily result in more complex forms of life. »Reduction clearly proves to be an evolutionary advantage at times—this phenomenon is very common in many parasites,« says Theißen. The genetic data that has now been published proves that all modern-day bryophytes are more closely related to one another than to any other group of plants. This had been one of the most contentious issues concerning the evolution of terrestrial plants. The appearance of liverworts, which seem highly primitive compared to mosses, is probably due to subsequent simplifications of their form. ■

Original publication:

One thousand plant transcriptomes and the phylogenomics of green plants. *Nature* (2019), DOI: 10.1038/s41586-019-1693-2

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Observing HIV on a live stream

AIDS is caused by human immunodeficiency viruses (HIV) that put immune cells— »T helper cells«—out of action. Instead of controlling other immune system cells in the defence against pathogens, infected T helper cells produce large quantities of new human immunodeficiency viruses. With the help of ultra-high-resolution imaging, an international research team including scientists from the University of Jena, has now managed to observe the spread of human immunodeficiency viruses amongst living T helper cells in real time.

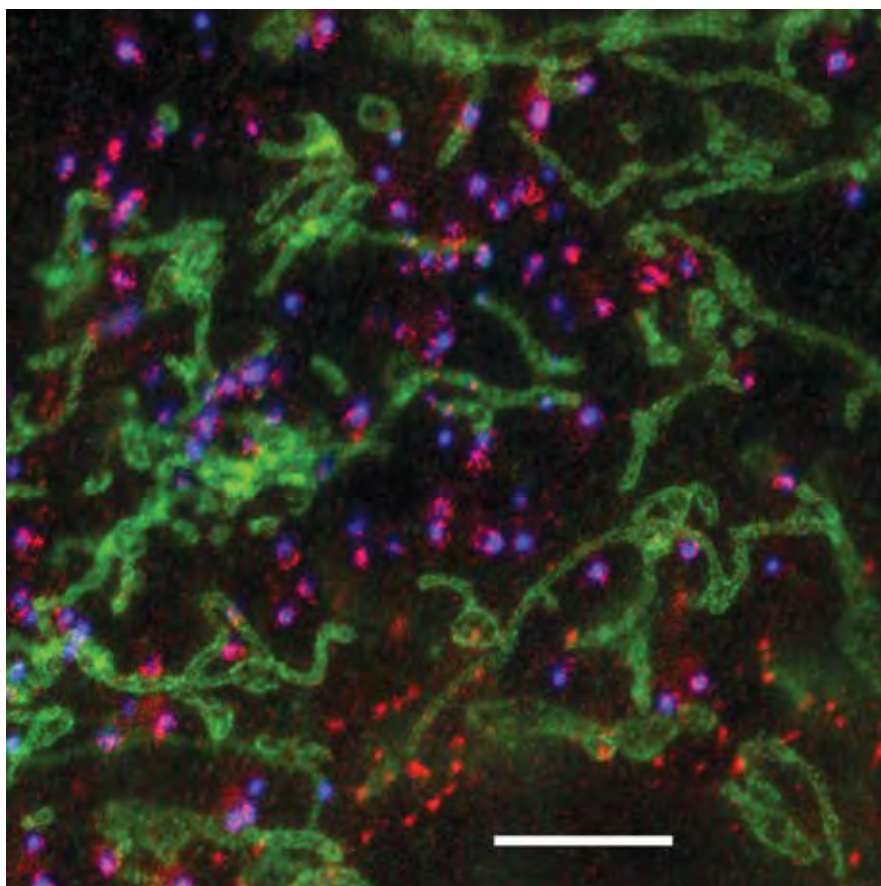
BY LAVINIA MEIER-EWERT

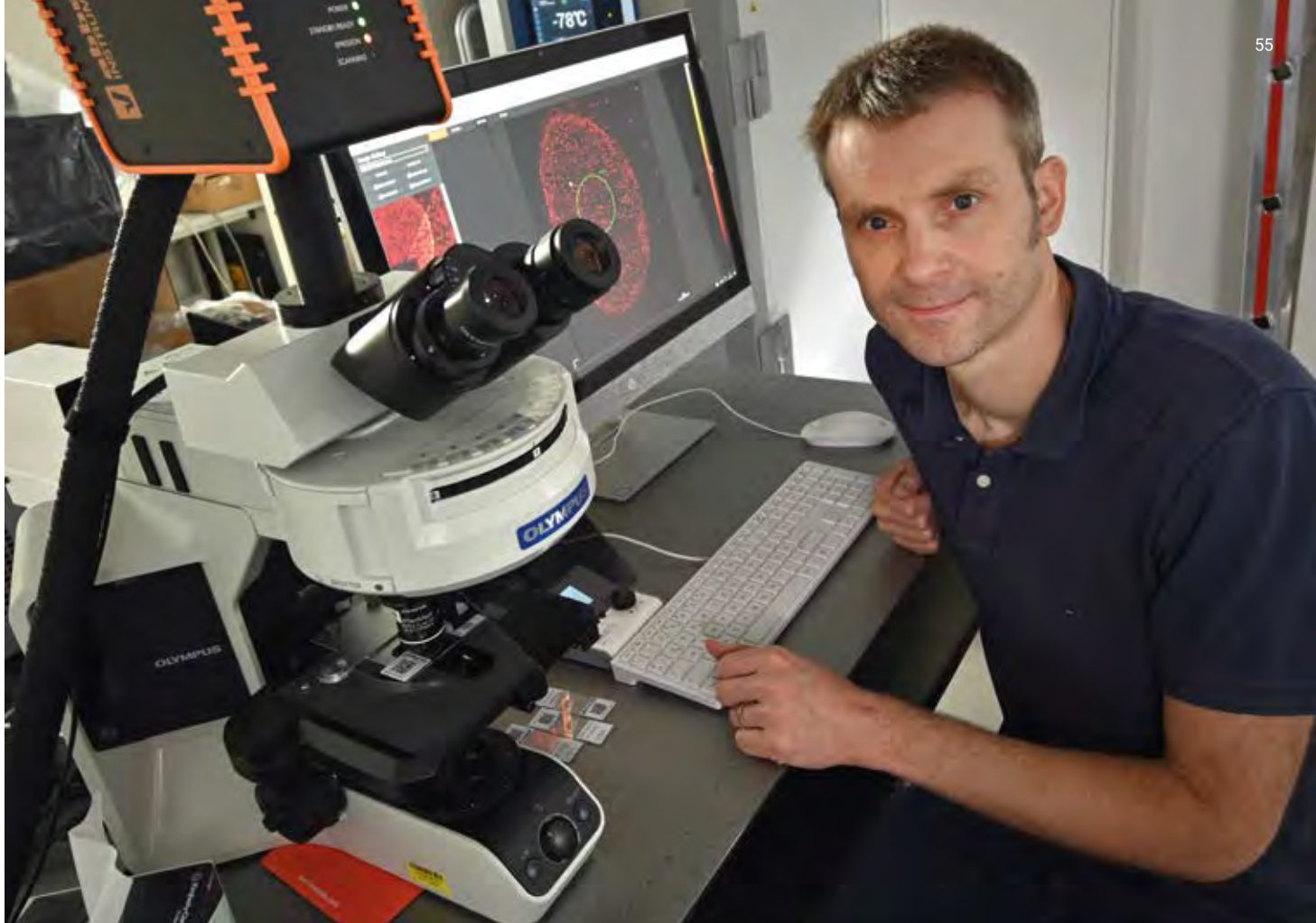
The research team is using super-resolution STED fluorescence microscopy (see box on p. 55) to provide direct proof for the first time that the AIDS pathogen creates a certain lipid environment for replication. »This gives us a few starting points when it comes to investigating how to potentially prevent this reproduction,« says Prof. Dr Christian Eggeling, who conducts research and teaches at the Friedrich Schiller University Jena, the Leibniz Institute of Photonic Technology, and the University of Oxford. Together with his colleague Dr Jakub Chojnacki and a team of researchers directed by Prof. Dr Delphine Muriaux and Prof. Dr. Cyril Favard at the University of Montpellier Christian Eggeling has been examining the plasma membrane of infected T helper cells.

The researchers have been focusing on the »gate« through which the human immunodeficiency virus buds from the cell after multiplying inside. The »Gag« protein, which coordinates the processes involved in the assembly of newly produced virus particles, was used as a marker by tagging it with a green-fluorescent molecule. »Where this protein accumulates, the decisive processes take place that lead to the viruses releasing themselves and infecting other cells,« explains Christian Eggeling. In order to decipher these processes, the researchers examined the diffusion of the lipid molecules to and at the place where the »Gag« proteins gather, i.e. where the virus particle buds. During the budding process, the virus particles exit the cell through the plasma membrane and receive their lipid coating. By employing

different types of red-fluorescent labeled lipids, Eggeling and his colleagues have now discovered that only certain lipids from the cell membrane interact with the human immunodeficiency virus. Although these lipids were already known, the research team has managed to directly observe this interaction in living cells for the first time. »This provides us with a potential target for antiviral drugs,« says Christian Eggeling. »Knowing which molecules the human

STED microscopy enables super-resolution imaging. Here we can see the cellular components of fibroblast cells: mitochondria (green) and the peroxisomal protein PEX5 (red) on the surface of peroxomes measuring approx. 200 nanometres (blue), which cannot be resolved with conventional confocal fluorescence microscopy. The white bar is five micrometres long (five thousandths of a millimetre). Adapted from »The Journal of Biological Chemistry« 291, 16948-16962, 2016.





Prof. Dr Christian Eggeling helped develop the STED microscopy method during his time in the laboratory of Stefan Hell in Göttingen, who went on to win the Nobel Prize in Chemistry in 2014.

immunodeficiency virus needs to exit the cell and multiply is a crucial prerequisite for investigating how this can be prevented. Our technology enables us to follow the developments directly in real time«. Eggeling is now working with his team on the development of antibodies to attack precisely these molecules—and thus suppress the spread of the virus.

Tracking the movement of molecules in real time

»We not only want to examine these antibodies from a medical perspec-

tive, but also to find out how their biophysical interaction can be exploited to make them more effective,« states Eggeling. He is trying to understand how diseases develop on a molecular level by combining superresolution fluorescence microscopy with technology that tracks the movement of marked molecules in real time. This enables the spatial and temporal examination of individual molecules in living cells. »We can now reveal cellular mechanisms on a molecular level; these mechanisms were much too fast and occurred over far too small spatial scales for previous methods of investigation.« ■

STED microscopy

STED stands for »stimulated emission depletion«. It is a method used in fluorescence microscopy that allows the optical resolution limit described by Ernst Abbe to be bypassed. Light is used to excite fluorescent dyes, which then spontaneously emit light. This spontaneous emission can be suppressed with the addition of high-intensity light at the wavelength range of the emission. This de-excitation light is placed in a ring around the focus of the sample to be examined, restricting the emission of fluorescent light to the centre of the sample. This optical trick makes the effective focal point significantly smaller, and its dimensions are below the Abbe diffraction limit.



Original publication:

HIV-1 Gag specifically restricts PI(4,5)P2 and cholesterol mobility in living cells [...] Science Advances (2019), DOI: 10.1126/sciadv.aaw8651

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Digital revolution

Interdisciplinary graduate college receives funding from State of Thuringia

All areas of modern life are affected by digitalization. As part of a new graduate programme, doctoral candidates are examining the impact of digitalization on economic processes. They want to investigate how digitalization is affecting different economic actors and institutions and what consequences it has for them. The new graduate programme will receive 1.35 million euros in funding from the State of



Thuringia over the next three years. The spokesperson for the group, Prof. Dr Maik Wolters (pictured left), identifies one of the research objectives: »One aspect of the current digitalization phase is the generation of large volumes of data. We want to adapt new statistical methods for use in the social sciences, so that we can use this data in our research,« explains the Professor of Macroeconomics. sh



Pension plans

Economists analyse popular opinions on pensions

Pensions are no longer safe. But how widespread is this knowledge amongst the population? Finance expert Prof. Dr Silke Übelmesser (pictured left) from the University of Jena and a colleague from the University of Man-

nheim address this question as part of their project. The Federal Ministry of Labour and Social Affairs will award 290,000 euros in funding over the next three years, and the University will be making its own contribution to increase the total volume to 390,000 euros. The experts want to find out whether people understand the pension system in the first place, and if a better understanding would make them more willing to accept reforms and take the initiative. They will ask for people's attitudes towards old-age pensions and determine whether different population groups have different opinions. This will allow them to develop recommendations for educational and social policy. PM

Synapses under fire

DFG-funded research group investigates autoimmune encephalitis

The neurologists, physiologists, neuroimmunologists, and microscopy experts in the new »SYNABS« research group are investigating the mechanisms underlying autoimmune encephalitis in order to find new treatments for the disease. The group with partners in Germany, Austria and Spain will receive 3.9 million euros in funding from the German Research Foundation (DFG) over the next three years. The



spokesperson for the group is the neuroimmunologist Prof. Dr Christian Geis (pictured left) from Jena University Hospital. Autoimmune inflammations of the brain occur when the immune system produces antibodies against receptors in the central nervous system. These antibodies interfere with the transmission of signals at the synapses, which can result in confusion, psychosis, epileptic seizures, or a loss of consciousness. vdG



Battery research

Chemists coordinate EU training programme for energy storage research

The European Union (EU) is supporting an »International Training Network« coordinated by the Friedrich Schiller University Jena. The aim of the »POLYSTORAGE« programme, which has been allocated almost four million

euros in funding, is to qualify a total of 16 doctoral candidates for leadership roles in the field of advanced energy storage (symbol photo) in both academia and business. Funding is provided within the framework of the EU »Horizon 2020« programme.

»This very comprehensive training programme combines basic research and applied science,« says Prof. Dr Ulrich S. Schubert, who coordinates the programme. It includes workshops, colloquia, and a final conference. A total of twelve funded institutions and thirteen partner institutions from research and industry are involved in the »POLYSTORAGE« programme. MK

Jena Experiment

DFG-funded research group investigates ecosystem functions

A new research group for the »Jena Experiment« will receive five million euros in funding from the German Research Foundation (DFG) over a period of four years. The scientists want to find out which mechanisms affect the relationship between biodiversity and ecosystem functions. A total of twelve scientific subprojects are involved in the new research group. The group is based at the German Centre for Integrative Biodiversity Research



(iDiv) and the Universities of Leipzig and Jena. The »Jena Experiment« site in the Saale floodplain (pictured left) (pictured left) features around 500 research plots with different combinations of meadow plants. This unique outdoor laboratory enables the collection of long-term data to answer fundamental questions on the role of biodiversity and ecosystem functions. PM

Christians in the GDR

Church historians research the discrimination of Christians in the GDR

Citizens in the GDR came into contact with state military policy from an early age—through military education classes and paramilitary competitions. Anyone who opposed the regime ran the risk of legal, social, occupational or educational discrimination. Christians in particular were subject to such measures if they refused to do military service. Their fate is now being examined by church historians at the University of Jena as part of a new project.



at the University of Jena as part of a new project.

The four-person project team directed by Prof. Dr. Christopher Spehr (pictured left) will receive around 600,000 euros in funding from the Free State of Thuringia. The results will be made available to the public in an interactive web atlas. In addition to archive material, interviews with contemporary witnesses will be used as sources. KB



»cultur3D«

EU funds project for digital culture and collection management

Modern digitalization technology enables the creation of authentic three-dimensional images of historical artefacts to preserve them for future generations. Moreover, cultural assets can be digitally exploited to remove

them from the shadows of closed magazines and present them to the public. Dr Andreas Christoph and his team at the University of Jena and the Thuringian State and University Library have taken on this challenge in 2017. The »cultur3D« project has now received fresh funding from the State Chancellery of Thuringia and the European Union—an additional 1.3 million euros will be invested in the project by the end of 2020. The aim is to develop workflows for optimal digitalization processes that can also be used by other institutions. Subsequently, the Jena experts want to further develop their innovative system up to series-production stage. sh



Medical machines

Cooperative project makes machines learn better

The Technical University of Ilmenau and the Friedrich Schiller University Jena have launched a joint project to improve the accuracy and reliability of medical measuring devices. They are developing innovative methods for the integration

of »intelligence« in medical technology, such as microscopes, tomographs, and ultrasound equipment (symbol photo left).

They hope to develop intelligent suggestion and decision systems to support and monitor the operation of medical technology and the evaluation of measurement results. This will help to avoid operating errors and ensure and simplify the correct analysis of measurement data. The research project will receive 1.35 million euros in funding from the State of Thuringia over five years. Prof. Dr Joachim Denzler and his team of computer scientists at the University of Jena are involved in the project. PM



Magdalena on track

In a place where others arrive and depart—some rushing, some searching, and some stranded—Magdalena Steinhöfel offers guidance and support. The 31-year-old theology doctoral candidate co-founded a charitable initiative at Erfurt Central Station, where she spends almost every minute of her free time as a volunteer. Her motivation as a counsellor and researcher is revealed in this LICHTGEDANKEN portrait.

BY SEBASTIAN HOLLSTEIN

When you arrange an interview with Magdalena Steinhöfel, it doesn't take long to find a suitable location. »I've already booked a quiet room for our chat,« says the doctoral candidate as we meet for the first time in the library foyer, and she runs off to fetch the key. Organization is part of her everyday life—especially at Erfurt Central Station, where the theologian from the University of Jena has been spending a lot of time in recent years. In 2015, she collaborated with like-minded people to found a charitable initiative at the train station. She explains her motives: »As Christians, we want to get involved and do something good for our society—based on our faith, but not to force people into religion«. As a place for meeting and saying goodbye, for moving and stopping, for being next to one another rather than together, a train station is a particularly suitable place for the Christian community to work outside church structures. During the first two years, they travelled around as the »Engel am Zug«—a German pun which means: »The angels turn at the train«. Now they can be seen wearing the striking vests of the »Bahnhofsmission« initiative. »Our teams are usually at the station twice a week and approachable for everyone,«

says Steinhöfel. »We support people with travel issues, provide information, calm people down when something goes wrong, and help senior citizens get on and off the train. But the most important thing is having conversations and taking the time«. After all, many people do not come to the station to travel; they simply want to be around other people. Magdalena Steinhöfel and her colleagues have become an important point of contact for them. While some just stop by to say »hello«, others talk about their everyday problems. »We have more time and therefore more patience for the homeless and people with mental health problems than, say, the station staff or police, who really appreciate our work,« says the 31-year-old.

Appreciation is important to Steinhöfel, because her charity work at the station is very demanding. She is often faced with difficult situations that linger on her mind, such as her encounter with a suicidal man whom she escorted to a psychiatric hospital. This highlights the importance of regular discussions within the group. »And it is very fulfilling and satisfying to know that you are doing something worthwhile.«

Magdalena Steinhöfel also visits train stations when she is off duty. She has always enjoyed taking the train—on her travels and in her everyday life. And she has certainly discovered the tracks of Thuringia: She was born in Rudolstadt, grew up in Weimar and went to boarding school in Schulpforte before coming to Jena for her studies in 2008—after volunteering for a year at the Music Academy of Arnstadt-Ilmenau. A teacher had motivated her to study Christianity at university. As her bachelor's programme was not giving her the desired depth, she decided to take an additional diploma in Protestant Theology. She obtained her bachelor's degree in 2012 and completed her diploma four years later; her doctoral programme started shortly thereafter. Her doctoral thesis project is also strongly influenced by her Thuringian roots, as she is examining the work of pastors in the largely secularized eastern German states.

The special situation of pastors in East Germany

During her studies, she realized that academic pastoral theologians dealt very rarely with the situation of the Church in eastern Germany. Pastoral theology provides pastors with guidance on how to fulfil their role and practise their profession. »Academic outlines are almost always written from the perspective of West Germany, where church structures are more firmly anchored in society and each pastor is responsible for far fewer congregations than in East Germany,« explains Steinhöfel. »If the basic academic work does not consider the special situation in the east of the country, however, it will fail to adequately prepare young pastors for the challenges in their profession, where they are sometimes responsible for 15

Magdalena Steinhöfel as an »Engel am Zug« at Erfurt Central Station (left) and as a counsellor at a retirement home in Jena (below).



congregations at the same time«. She argues that dealing with this situation is not only important in order to do a good job in East Germany, but also to prepare for future developments occurring throughout the country. After all, social and religious transformation processes can be observed in almost all regions of Germany. »It is important that pastors actively and conscientiously work on their job profile and their role in a theological manner to adapt to new developments,« explains the doctoral candidate. »That means, for example, if I want to live here with mostly non-religious people, I have to be prepared to occasionally leave my traditional environments and church structures and create new ones. I have to ask myself: What is available here and what can I contribute from my position?« The charitable initiative at Erfurt Central Station is a good example of such a contribution.

There is a close link between Magdalena Steinhöfel's academic work and volunteering, and she speaks clearly and cheerfully about both. She sometimes takes a few moments to consider before answering appropriately and puts conversations on hold if they go too far off topic before referring back to them later on. Exchanging views with other people is important for her to constantly reflect on her thoughts and actions—and she seizes every opportunity to do so. Even her reaction to our interview enquiry sounds more curious than cautious: »Of course! I've never done anything like that before, so why not?« It therefore comes as no surprise that, on the one hand, she would like to continue her work in academia after completing her doctorate, but she would also like to take on a practical role within the Church. »I just need both—theoretical research and direct contact with people«. She found the latter during her recent work as a counsellor for senior citizens in Jena. She has also organized leisure activities for children and worked as a palliative carer. But how can she process the experiences that go hand in hand with such work? »After a hard day's work, my mental cleansing usually involves me sitting at home and staring at the walls for fifteen minutes as I let everything sink in and think about what's happened,« explains the theologian. »I also find it helpful to put everything into my prayers with God at the end of the day«.

Switching off and enjoying the moment

At times, switching off can also mean letting go. »I am a very structured person and sometimes go over the top with my planning and preparation. My friends would definitely agree with me there,« admits Steinhöfel. »At the station, I am frequently reminded of how important it is to give up control and enjoy the moment«.

She will have more opportunities to do this in the future, as the project at Erfurt Central Station should really get going in two years at the latest. Magdalena Steinhöfel and her »Angels on the Train« have found a room once again, as they are currently planning to build a small pavilion on a platform, so that the charitable initiative can become a permanent point of contact for those in need of help. ■

Researchers for a night

On 22 November, around 10,000 visitors of all ages turned the night into day in Jena, as the University took part in the seventh edition of the »Long Night of Sciences« with around 100 events. The amateur researchers had the opportunity to ride on a flying carpet, make perfume, and experiment with magnets. The »Deutscher Wetterdienst«, Germany's national meteorological service, launched a stratospheric balloon from the Institute of Solid State Physics, transmitting live data to the lecture theatre.







Thousands of citizens protest in Jena, undated photo from 1990.

Jena remained quiet for a while

The Berlin Wall fell on 9 November 1989, 30 years ago. Those who were there will certainly remember the moment, which symbolizes the success of the peaceful revolution in the GDR like no other. But how was the situation at the Friedrich Schiller University Jena in autumn 1989? We take a look back at history.

BY STEPHAN LAUDIEN

»As far as I'm aware... immediately«. Those were the clumsy words, stuttered by SED official Günter Schabowski, which brought the Berlin Wall to the ground. As the euphoria of 9 November 1989 set in, the steam began to escape from the pressure cooker known as the GDR. Yet the »revolution«—the term used by SED Secretary General, Egon Krenz—had already reached its climax by 4 November. Hundreds of thousands of people gathered on Alexanderplatz in Berlin to celebrate the speakers of the opposition and jeer the hardliners of the nomenklatura. It had been brewing in the country for quite some time—and not just in political centres like Berlin and Leipzig; resistance had also been stirring in the provinces. The courage of individuals suddenly blossomed into a mass movement. While Mikhail Gorbachev was demanding glasnost and perestroika—openness and reformation—in the Soviet Union, the GDR remained at a standstill. The USSR had become a bearer of hope, which made it all the more astonishing

when »Sputnik«, the Soviet press digest, was banned in November. One year previously, SED Chief Ideologist Kurt Hager had stated that you do not have to redecorate your house just because your neighbour is renovating his own.

»Reformhaus« as the precursor of the student council

Things remained quiet at the University of Jena for a long time. Critical thinkers like Roland Jahn, Jürgen Fuchs, Lutz Rathenow, and Siegfried Reiprich had already been expelled in previous years. The first sign of rebellion was the Ambulancia campaign of 1988, when students raised money for an ambulance for Nicaragua without the involvement of the »Free German Youth«, the official youth organization of the GDR. This continued in autumn 1989, when the »Reformhaus«, a plenum within the university, was held by around 800 students, some employees and guests. A special edition of the socialist uni-

versity newspaper was even published on the theme of »courage not rage«. The »Reformhaus« led to the emergence of the student council in mid-November 1989. Rector Hans Schmigalla recognized the committee—»despite concerns«—and was open to cooperation, which led to the establishment of the student council on 23 November 1989. Gert Noack became the first chairman. In early December, when the Berlin Wall was already history, the »Action Committee for the Democratic Rehabilitation of the University« was founded on the initiative of several lecturers led by the late Dietfried Jorke. This was followed by the reelection of the Academic Council in January 1990 and the election of a new rector in February: While Gerhard Riege received the most votes, the jurist's election was disputed. In April 1990, physicist Ernst Schmutzer prevailed as the 314th rector of the Alma Mater Jenensis. Under his aegis, the university made the laboured transition to a restored, democratized institution.



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