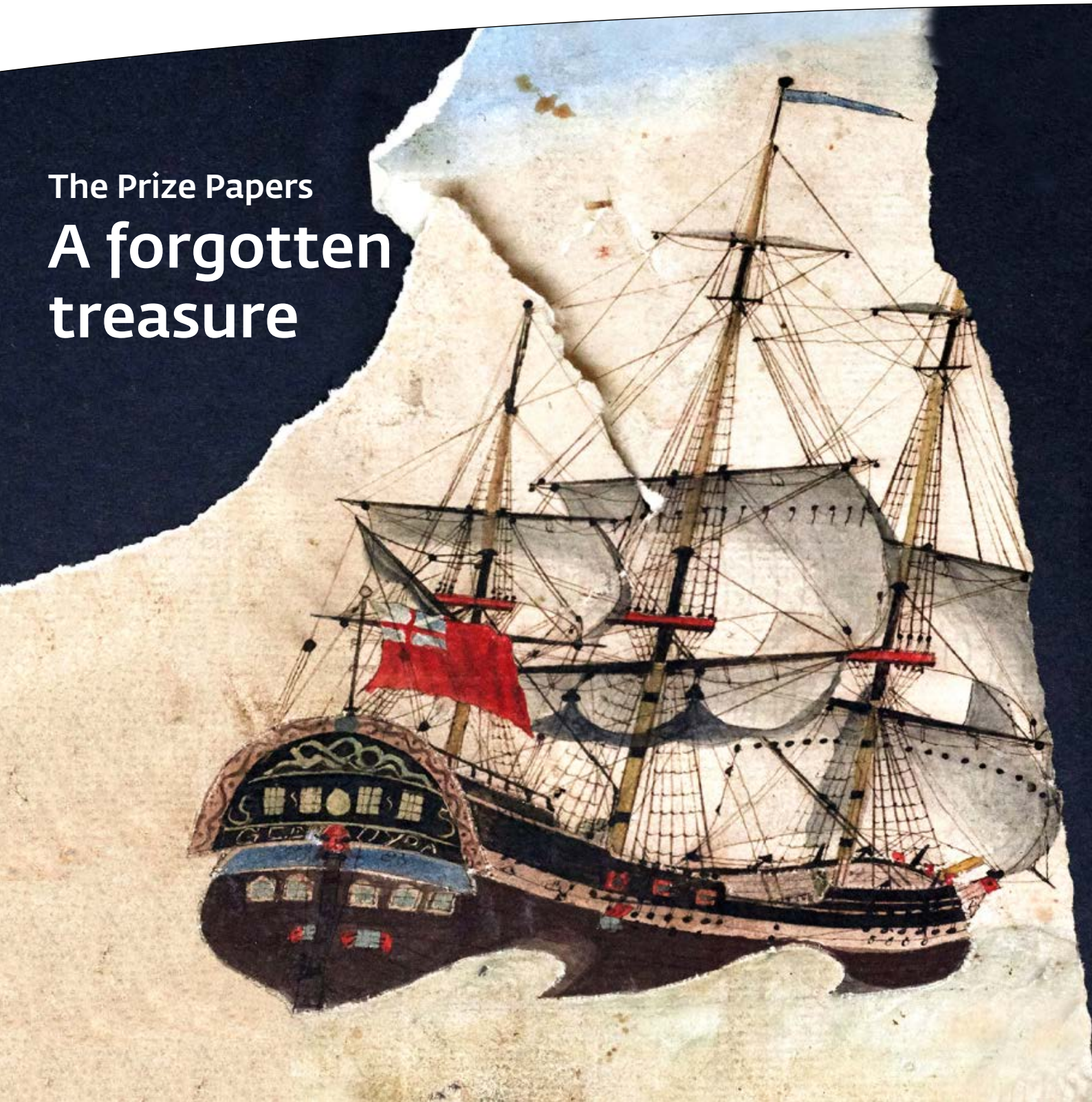
Carl von Ossietzky
Universität
Oldenburg

2021/22 Issue

THE UNIVERSITY OF OLDENBURG'S RESEARCH MAGAZINE

EINBLICKE 66



The Prize Papers
A forgotten treasure

Dear reader,

in October, a semester has begun at the University of Oldenburg that is supposed to bring a return to more normality - for studying, teaching, researching and working on campus. According to the guiding principle "Responsible In-Person Attendance", the aim is to allow personal encounters while making sure no one's health is put at risk. Nevertheless, larger courses and events in particular can only take place digitally. The situation also remains challenging for our researchers and their teams. Despite the demanding pandemic conditions of the last eighteen months, they have succeeded in maintaining high teaching standards and advancing their scientific work. This issue pays respect to their achievements and sheds light on a few of their many outstanding results.

We present the Prize Papers, one of the largest historical research projects in Germany, headed by historian Dagmar Freist. This huge collection of documents and other objects stems from the age of maritime warfare from about 1650 to 1815 and includes some 160,000 letters, many of which have never been opened. Read all about how Oldenburg researchers are examining this treasure trove, and about the secrets they have already uncovered.

Some animals' astounding ability to orient themselves using the Earth's magnetic field is the focus of a new Collaborative Research Centre at the university. Biologist Henrik Mouritsen has brought together an international team of experts to investigate this "sixth sense" from a range of perspectives – from neurobiology to quantum physics and computer modelling.

What will the operating theatres of the future look like? What is the impact of high-tech innovations on workplace conditions and also on patient safety? These are the kind of questions surgeon Dirk Weyhe is examining. From smart lighting to virtual reality – his own operating theatre is already equipped for the future.

Economist and political scientist Bernd Siebenhüner is deeply committed to sustainable development – on multiple levels. In our portrait piece you can read all about him and the various aspects of his research.

Also in this issue: how for the first time Oldenburg marine scientists have managed to breed stony corals in Germany; why, 70 years on, Adorno's Minima Moralia are as relevant as ever, and the importance of German loanwords in Upper Silesian.

We wish you a stimulating read!
Yours truly,

the EINBLICKE editorial team

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In Numbers

5,144

is the number of items in the Library and Information System's New Music from Eastern Europe collection

Traditional music, concert music, and religious music are the main focus of the collection. The broad range of compositions, music-making practices and materials conveying musical traditions highlights the richness and diversity of Eastern Europe's musical culture.
The collection consists of two parts. The core element is the New Music in Eastern Europe Archive established by Oldenburg composer and musicologist Professor Violeta Dinescu in 1996. It includes publications by Romanian musicologists as well as musical scores, recordings and concert programmes all dealing with the music of Southeastern Europe, with a special focus on Romania.
This archive has frequently been used in the composers' colloquium "Music of Our Time", which is led by Dinescu and held at the Institute of Music on a regular basis. The materials also play a key role in Dinescu's symposium ZwischenZeiten (Shifting Times), which has dealt with different aspects of Romanian music history every year since 2006.
The second part of the collection was added in 2010 and comprises the estate of musicologist and journalist Detlef Gojowy, who maintained close contact with composers and musicologists in Eastern Europe during the Cold War. This archive also consists of correspondence, sound recordings, concert programmes and photographs. Teachers and students of musicology frequently use the correspondence to explore topics such as intercultural exchange between Eastern and Western Europe or the challenges of artistic activity in Eastern Europe.
This extensive collection, which has been growing steadily for 25 years, also includes thousands of other musicological publications, sound recordings, programmes, music notations, letters, manuscripts, and photographs which have yet to be catalogued.

Planning sustainability

Bernd Siebenhüner is committed to sustainable development – on many levels. As a professor of ecological economics he is concerned with "planetary boundaries" and the United Nations Sustainable Development Goals. His aim: to design a liveable, sustainable, socially just and ecologically sustainable future

Mountains on one wall, the sea on the other: The pictures in Bernd Siebenhüner's office alone illustrate that this researcher is impossible to pigeonhole. In his various roles as coordinator, manager or initiator, the Oldenburg professor of Ecological Economics is involved in a broad spectrum of sustainability projects: from collective learning processes and climate adaptation to international environmental policy; from organic agriculture in Africa and education for sustainable development to participatory processes for sustainability implementation.

The thread that holds together this colourful bouquet of research focus areas, says Siebenhüner, is transdisciplinarity. "My research is solution-oriented, it addresses socio-ecological problems and develops sustainable solutions in collaboration with stakeholders." For Siebenhüner, this represents the greatest challenge as well as the greatest source of satisfaction: research that aims from the outset to be close to concrete developments in order to address global challenges.

Creative minds, flat hierarchies

Born in Delmenhorst near Oldenburg, Siebenhüner grew up in Berlin and studied political science and economics at the Freie Universität Berlin. He did his PhD at Martin Luther University Halle-Wittenberg before moving to Oldenburg in 2002 to take up the position of Junior Professor of Ecological Economics and head the junior research group "Social Learning and Sustainability". As a young university with a special focus on interdisciplinarity and environmental research, Oldenburg had an excellent reputation, says Siebenhüner: "Lots of creative minds in management studies, a focus on environmental research, flat hierarchies, open doors. That really appealed to me. And it also allowed me to realize projects I could have never have dreamed of as a junior professor e.g. in Halle – for example, designing a new course in sustainability." That is, what Siebenhüner did in Oldenburg: The Master's programme in Sustainability Economics and Management was launched in 2006.

At the time, Siebenhüner was also working as a visiting researcher at the Potsdam Institute for Climate Impact Research (PIK). "I was offered the chance to lead junior research groups at both institutions. And as is my wont when I can't make up my mind, I accepted both offers." From 2002 to 2005 he occupied the two positions in Potsdam and Oldenburg simultaneously. "It was an exciting time because the discussions on climate change in non-university research were different to those at the university." Professor Hans Joachim Schellnhuber, one of the world's leading climate researchers and director of the PIK for many years, sometimes dropped by Siebenhüner's office back then. "So, what questions are on the minds of Oldenburg researchers these days?" he wanted to know. Schellnhuber himself is an Oldenburg alumnus: it was there that he earned his habilitation, and he was a professor and director of the university's Institute for Chemistry and Biology of the Marine Environment (ICBM) in the early 1990s.

Exchange with students as motivation

In the end, the "Berlin boy" Siebenhüner opted for Oldenburg and a university career. "The intellectual exchange with other disciplines produces greater diversity in the sustainability discourse than you get at a non-university research institute which has a single thematic focus." Another point in favour of the university: "I love the exchange with students because of their high level of motivation to get things moving and put them into practice," the 52-year-old enthuses. It was the students, for example, who initiated the founding of the Oldenburg group of "Scientists for Future". The objective of the group, which Siebenhüner helps coordinate, is to promote climate protection at the university and raise awareness of the climate crisis among the general population.

By the same token, Siebenhüner finds it most important to reach out to the students and "get them on board". The university's Sustainability Report, which was published under his lead for the third time in 2021, is an excellent example of this. It was compiled by 20 students from various Master's programmes. The results in a nutshell: the university's direct greenhouse gas emissions were almost 70 percent lower than at the time of the previous report. "This is primarily a result of the university switching to clean power. It sends a strong signal to other large institutions in the region. Decisions like this can ultimately influence the market," the political scientist and economist explains.

Economic activity within planetary boundaries

Sustainability is the issue underpinning all of Siebenhüner's academic work and projects. He is driven by the conviction that society needs an economic system that will meet people's needs, but is consistent with basic ecological principles. "Economy within planetary boundaries is the formula we use to describe a sustainable and ecologically-oriented economy," Siebenhüner explains.

Whereas traditional economics argues that the purpose of economic activity is to satisfy people's needs as best as possible and maximize utility, relegating other systems such as nature, climate and the environment to the role of mere contributors, ecological economics turns this thinking on its head: society is embedded within various ecological systems; economic activity is an instrument rather than the prime objective.

But while Siebenhüner is clearly com-

mitted to sustainable economic activity in his work, how sustainable is his own lifestyle? “That’s an important question,” says the scientist, and one, he adds, that anyone involved in the sustainability discourse should ask themselves. “Do we practise what we research and preach in our private lives?” Siebenhüner certainly tries to – and the city of Oldenburg provides a good starting point for keeping his ecological footprint as small as possible. The father of three doesn't own a car, for example. “Everything is so close by that I go everywhere by bike or on foot. I enjoy living here,“ he says.

Siebenhüner is convinced that the University of Oldenburg has long been a trailblazer in the quest for a sustainable society, but that it needs to keep working to develop this role and lead the way into the future. “We have to be pioneers, an engine for change at the local level in order to promote solutions for the city and the region.”

Concrete solutions for Oldenburg

The scientist is already pursuing concrete solutions for the city at the former military air base in Oldenburg. The interdisciplinary research project Energy-Efficient Neighbourhood Fliegerhorst Oldenburg (ENaQ) aims to create a climate-neutral neighbourhood by 2023 and serve as a model for smart cities. The project focuses on technology development and testing, digital solutions and people’s participation with the goal of facilitating the development of further smart city neighbourhoods.

Siebenhüner considers the principle of participation to be integral to the ENaQ project: “Amazing technological advances have already been made, but as long as people are not convinced of their benefits, these inventions will never be adopted and used.” For a functioning social system operating within planetary boundaries, you need both technological changes and behavioural changes, he says. “But the two must go hand in hand.” Which, in Siebenhüner’s view, makes it all the more important to put people at the centre of the project. This is the only way to create a carbon-neutral residential neighbourhood that meets the needs, wishes and interests of the participants, he explains. “It is an incredible opportunity to be involved in designing a neighbourhood like this.”

Africa: a strong partner

The ecological economist is not only searching for solutions locally – but on other continents as well. “Through the University of Oldenburg’s cooperation projects with South and East Africa, I have come to know and love the African continent. These projects have shown me just how much needs to be done to address the problems on the ground,” says Siebenhüner. However, he objects to the outdated approach to development cooperation that seeks to impose ideas from the Global North on the Global South. “The thinking has changed. It’s all about working together now, because we’re all in the same boat when it comes to the UN Sustainable Development Goals. So we need to build cooperation with our African partners on equal footing,” explains the former vice president of the University of Oldenburg, who worked at Nelson Mandela University in Port Elizabeth, South Africa, from October 2014 to March 2015.

The University of Oldenburg – together with the University of Dar es Salaam in Tanzania – was a key partner in the project Ecosystem-Based Solutions for Resilient Urban Agriculture in Africa (ECOSOLA), which Siebenhüner coordinated. The researchers in the project were looking at how urbanization, housing, food security, access to bio-energy and infrastructure can be designed sustainably without overburdening the ecosystem. A rural community in the coastal region of Tanzania near the outskirts of Dar es Salaam was serving as a living laboratory. Siebenhüner’s research group “Ecological Economy” and the “Landscape Ecology” group led by ecologist Professor Michael Kleyer worked closely with African colleagues for three years on the project, which ended in 2021.

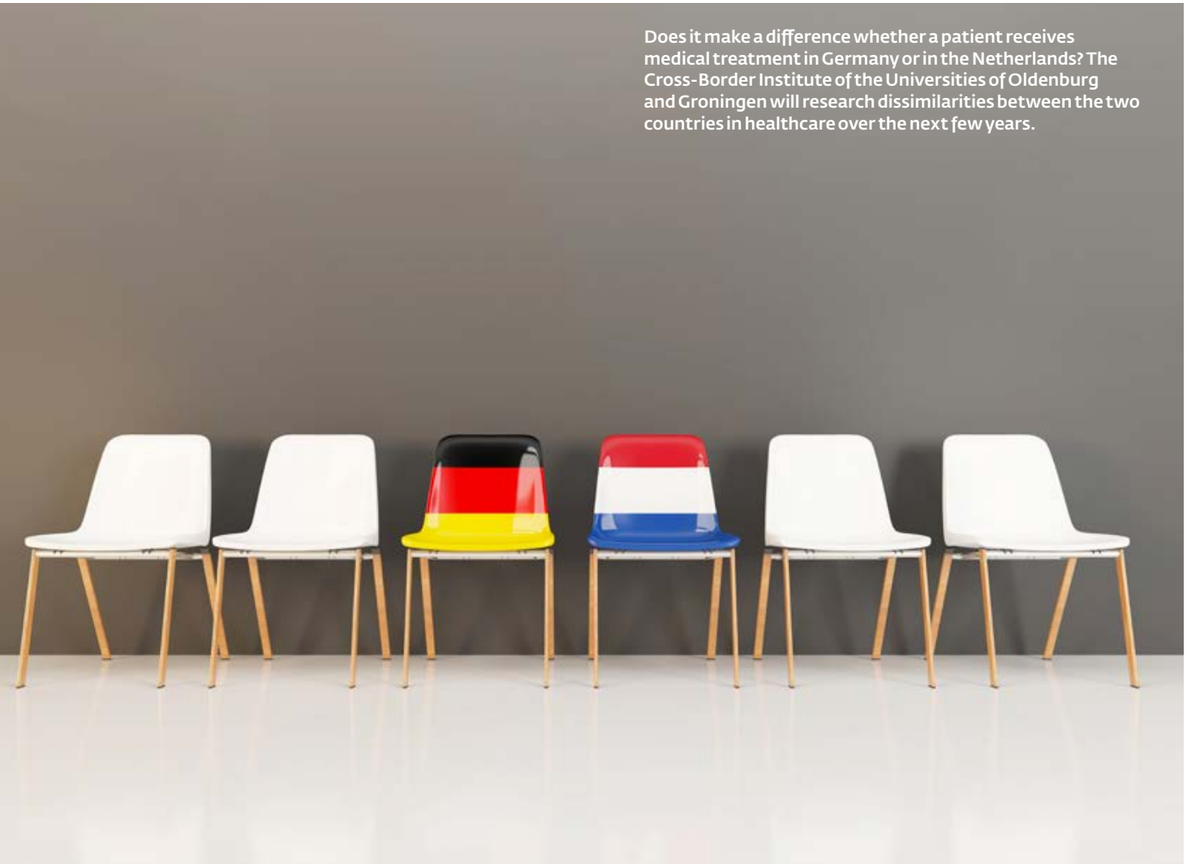
UN Sustainable Development Goal: “Quality education for all”

Another project close to Siebenhüner’s heart is the Centre of Excellence for Educational Research Methodologies and Management (CERM-ESA) at Moi University in Western Kenya. Siebenhüner helped set it up in 2014 and it is now starting to bear fruit. The project is dedicated to modernising the education system in East and Southern Africa. “Education has the potential to reinforce the United Nations Sustainable Development Goals. It enables us to really push forward ecological, social and economic objectives,” Siebenhüner explains. What he finds particularly convincing about this project is the way that five universities from Germany and Africa are working together to pave the way for a future-oriented culture of education. “And we all are learning from one another.” (kl)

Effective health services across borders

The healthcare systems of Germany and the Netherlands are the focus of a new research project of the Universities of Oldenburg and Groningen: An interdisciplinary consortium headed by Oldenburg health services researchers Prof. Dr. Falk Hoffmann and Prof. Dr. Lena Ansmann will investigate how structural differences in these two healthcare systems affect healthcare for patients in the Ems Dollart Region. The background of the project: In Germany and the Netherlands, healthcare is organised very differently, although both health care systems face similar challenges. However, how these structural differences in care affect treatment outcomes has hardly been systematically investigated so far. The current project aims to close this gap.

The aim is to systematically compare the peculiarities of both health systems at different levels and to lay the scientific foundations for cross-border healthcare. The rural border region in the north-east of the Netherlands and in the north-west of Germany serves as a living laboratory for the project team. The researchers plan to build a data infrastructure that identifies and brings together publicly accessible information about the organisation of healthcare systems in the Ems Dollart region on both sides of the border. The data will form a basis for future scientific research. Specifically, the research team is studying healthcare services in three different sectors: for example, the researchers want to compare how frequently antibiotic-resistant bacteria occur in patients with urinary tract infections, what differences there are in clinical rehabilitation after hip surgery and how healthcare in nursing homes differs in the two countries.
The project "Comparison of healthcare structures, processes and outcomes in the German and Dutch cross-border region (CHARE-GD I)" will be funded by the Ministry for Science and Culture of Lower Saxony (MWK) with about one million euros over the next three years. The project is based at the Cross-Border Institute of Healthcare Systems and Prevention, a joint initiative of the University of Oldenburg's School of Medicine and Health Sciences, the University of Groningen and the University Medical Center Groningen.



Does it make a difference whether a patient receives medical treatment in Germany or in the Netherlands? The Cross-Border Institute of the Universities of Oldenburg and Groningen will research dissimilarities between the two countries in healthcare over the next few years.

Batteries of the future

A new way of producing batteries is the focus of the new research project NANO-3D-LION. Over the next five years, chemist Dr. Dmitry Momotenko will develop an innovative 3D electrochemical printing technique for manufacturing lithium-ion batteries. The goal is to boost the output power and to reduce the charging times of the batteries to just a few seconds. Portable electronic devices, electric vehicles and robotic systems all need efficient energy storage. However, the architecture of current rechargeable lithium-ion batteries limits their performance. In the new project, Momotenko is therefore investigating how to manufacture batteries in the future using a 3D printing technique on the nanoscale. The European Research Council (ERC) is funding the project with around 2.25 million euros as part of a "Starting Grant". This funding supports outstanding early career researchers who want to set up their own research group.

Multiculti of microbes

Growing microorganisms and their natural communities in the lab – that's what the project "Cultivation of previously uncultivated microorganisms from different aquatic habitats" (MultiKulti) is working on. The coordinator of the joint project is the microbiologist Prof. Dr. Martin Könneke, Institute of Chemistry and Biology of the Sea (ICBM). The aim of the team of researchers from all over Germany is to develop a bioreactor. This should simulate microbes' natural living conditions in such a way that they can be cultivated permanently in the lab. In the long term, the aim is to create an automated system managed by artificial intelligence that can support different research approaches - for example, on the ecology of microbes or for biotechnological applications. The Federal Ministry of Education and Research (BMBF) is funding the project with 2.5 million euros over a period of three years.

How is soil salinization impacting agriculture?

Climate change is negatively impacting coastal areas: soil salinity is increasing, soils are degrading and agriculture is feeling the pinch. The project Saline Agriculture as a Strategy to Adapt to Climate Change, in which the University of Oldenburg is also participating, looks at how agriculture can adapt to the changing conditions and contribute to food security. With around 1.3 million euros in EU funding, the project aims to improve the resilience of food production in saline and potentially saline agricultural areas in Mediterranean and North Sea regions and implement climate-smart solutions to help it withstand the impact of climate change.

Online experiment on vaccine allocation

What would vaccination strategies look like if the general public were allowed to decide how vaccines are distributed in a pandemic? This is the question political scientists Professor Markus Tepe, Dr. Michael Jankowski and an international team of researchers are investigating in an online experiment involving 16,000 participants from eight countries. The project "Who should get the vaccine first?" will receive just over 112,000 euros in funding from the Volkswagen Foundation over an 18-month period. The researchers aim to find out what conditions would lead to an equitable distribution of vaccines between the countries of the Global North and the Global South.

Homing in on the smallest possible laser

At extremely low temperatures, matter often behaves differently than usual. Physical particles can give up their independence a few degrees above absolute zero temperature and merge into an object with identical properties for a short time. Such Bose-Einstein Condensates represent a special aggregate state of matter. An international team led by the Oldenburg physicists Dr. Carlos Anton-Solanas and Prof. Dr. Christian Schneider has succeeded for the first time in generating this unusual quantum state in charge carrier complexes that are closely connected to light particles and are located in ultrathin semiconductor sheets made of a single atomic layer. This produces light similar to that of a laser. The study focuses on quasi particles that consist of both matter and light. This is a coupling of excited electrons in solids and light particles. The phenomenon could be used to create the smallest possible solid-state lasers.

Ground-breaking ceremony for the new Helmholtz Institute in Oldenburg

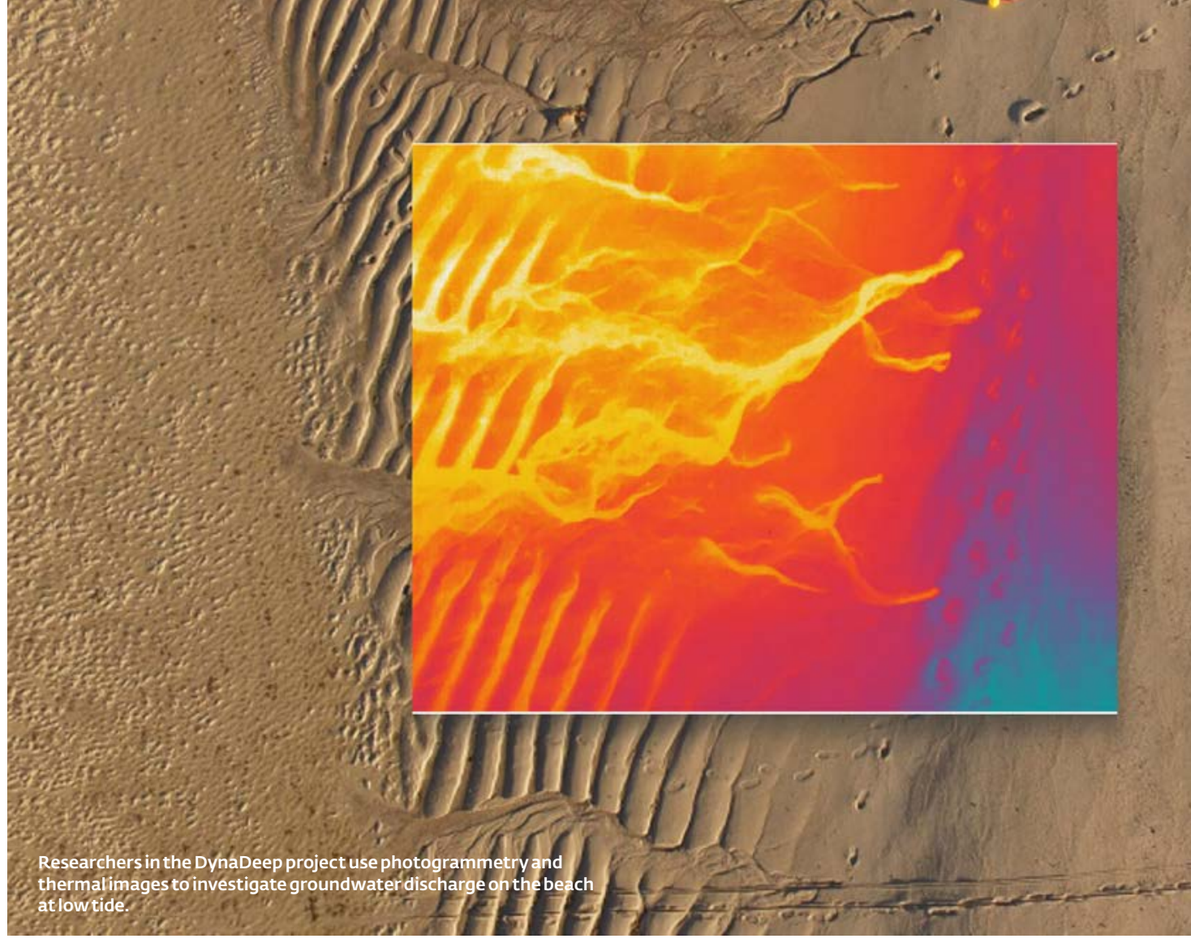
A symbolic groundbreaking ceremony was held in July to mark the start of construction work on the new Helmholtz Institute for Functional Marine Biodiversity (HIFMB). Located in the Technology Park in the Wechloy district of Oldenburg, the building will provide 2,000 square metres of usable space with 85 office spaces and around 650 square metres of laboratory space, thus offering ideal conditions for marine biodiversity research. Ninety percent of the institute's operating costs will be covered by federal funds and ten percent by funds from the State of Lower Saxony. At the ceremony the Science and Culture Minister for Lower Saxony, Björn Thümler, handed over a funding agreement for 15 million euros. The HIFMB was founded in 2017 as an institutional collaboration between the University of Oldenburg and the Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research in Bremerhaven to focus on changes in marine biodiversity and the consequences for human well-being and marine ecosystems. On this basis, the researchers develop sustainable conservation concepts for adaptive ecosystem management. The foundation stone ceremony is scheduled for spring 2022 and the building is due to open in 2023.

Targeted fall prevention

Improving assessment of the risk of repeated falls in older adults and providing targeted prevention: this is the aim of a new research project led by geriatrician Prof. Dr. Tania Zieschang. The Federal Ministry of Education and Research (BMBF) has approved 1.8 million euros in funding for the first three-year phase of the project. Several partners are involved in the "SeFallED" project. The research team will focus on people over 60 years of age who seek medical assistance at an emergency department after a fall and are discharged after receiving outpatient treatment. The study will follow about 450 participants for one to two years. In addition to a comprehensive geriatric examination, innovative technologies will be used to analyse the risk factors for further falls. This includes gait analyses on a so-called perturbation treadmill, which simulates jerky movements. The researchers also want to record movement data, evaluate it using machine learning methods and thus recognize habitual movement patterns that make a person prone to falls.

Hearing research with virtual reality

Many people find it difficult to hear in classrooms or near busy streets. In order to understand how acoustic perception works in complex environments, experts from Oldenburg are using virtual reality (VR). Together with partners, they are leading three projects in the new priority programme AUDICTIVE ("Auditive Cognition in Interactive Virtual Environments") of the German Research Foundation (DFG). The project of acoustician Prof. Dr. Steven van de Par is about realistically reproducing the acoustics of rooms in a virtual environment. The second project, led by Dr. Stephan Ewert, van de Par and Munich colleague Dr. Virginia Flanagin, places test persons in different virtual environments using VR glasses. The researchers want to find out how it is possible to estimate distances and movements by hearing. The third project with Oldenburg participation is led by the neuropsychologist Prof. Dr. Stefan Debener and the acoustician Prof. Dr. Volker Hohmann. The researchers want to understand how healthy people manage to filter out the voice of their current conversation partner from a variety of sound sources. To do this, they use mobile EEG devices and an acoustic simulation system that gives virtual characters realistic lip movements. The AUDICTIVE priority programme combines the disciplines of acoustics, cognitive psychology and computer science. The Oldenburg projects will receive a total of about 830,000 euros over three years.



Researchers in the DynaDeep project use photogrammetry and thermal images to investigate groundwater discharge on the beach at low tide.

A dynamical world underground

Beneath the surface of the North Sea's wave-battered beaches, a variety of chemical, geological and microbiological processes are taking place, about which little is known so far. This dynamic underworld is the focus of a new research group led by hydrogeologist Prof. Dr. Gudrun Massmann. The German Research Foundation is funding the project for four years with about five million euros. The scientists' primary objective is to assess the role that subsurface processes in dynamic subterranean estuaries play in coastal ecosystems and global carbon, nutrient and trace element cycling.

The new research group, called DynaDeep ("The Dynamic Deep Subsurface of High-Energy Beaches"), focuses on the dynamic underground environments where saltwater and fresh groundwater mix – known as the "subterranean estuaries" in technical terminology. Because of the constantly changing conditions, this area is probably fundamentally different from any other habitat in the deeper subsurface. The project is primarily concerned with so-called high-energy beaches, like those on the northern side of the East Frisian Islands. A primary characteristic of these beaches is that they are exposed to the full force of strong waves and they have a tidal range of several metres. In their project, the researchers want to take a closer look at the biogeochemical reactions at depth, which have hardly been studied so far.

In the first phase of the project, the focus is on the Spiekeroog site, where an underground sampling and monitoring network is to be set. In addition, the team wants to install a measuring pole equipped with various instruments in the intertidal zone, which generally dries out at low tide. The permanent installations will be supplemented by regular geophysical, hydrochemical and microbiological field campaigns. In a total of six subprojects, the researchers are conducting field investigations, experiments and mathematical modelling.

The team plans to subsequently test the findings from the first phase at other locations. In addition to Massmann's working group, researchers from the Institute for Chemistry and Biology of the Marine Environment as well as other partners outside the university are involved in DynaDeep. The team is supported by a network of cooperation partners and local stakeholders.

Snapshots of the past

The Prize Papers at the National Archives in London offer unique insights into the history of the early modern period from the perspective of individuals whose letters and personal notes would not normally have survived the centuries. The collection comprises hundreds of thousands of documents and artefacts from the period between 1652 and about 1815, which were stored in boxes at the Archives and all but forgotten for many years. In a long-term project led by historians at the University of Oldenburg, this treasure trove of records from the past is being opened up and made available to researchers and the general public

Letters were once the primary means of long-distance communication. They were sent with gifts, sealed agreements, and helped connect people far away from each other. Many of the estimated 160,000 letters in the Prize Papers collection are still unopened. Pictured here is a box containing bundles of letters from mailbags seized from the Spanish ship La Perla, which fell into the hands of English privateers off the Azores in 1779 (TNA, HCA 30/311).

The little notebook must have meant a lot to Johann Pohl. Its tattered, weather-beaten pages attest to frequent use and exposure to the elements. It is likely that its owner, a sailor from the Hanseatic city of Bremen by the name of Johann Pohl, carried it around with him at all times. It was in Pohl's possession for four years, until it was literally snatched from him aboard the Concordia, a Bremen merchant ship captured by English privateers on 6 April 1758 off the chalk cliffs of Beachy Head in the English Channel – a notorious spot for such manoeuvres.

Although the *Concordia* was sailing under the neutral flag of Bremen on its way from the Caribbean to Amsterdam, it was coming from French waters. And since at that time France was at war with England, this suspicious circumstance was deemed reason enough to confiscate not only its cargo of coffee, sugar and cotton, but also the mailbags it was carrying, as well as the ship's papers and the personal belongings of the captain, the nine seamen and one boy on board that made up its crew. These documents – known as the "prize papers" – were then submitted as evidence before the High Court of Admiralty in London so that it could uncover any links to an enemy party, in this case France, and decide whether or not the capture of the ship had been legal. For centuries the capture of "enemy" ships and their cargo was considered a legitimate tactic of warfare during times of war, including an own jurisdiction.

Although Johann Pohl's notebook was not used as evidence in the ensuing court process, it was kept with all the other documents and items taken from the *Concordia* in the archives of the High Court of Admiralty, and stored for several decades in the Tower of London together with the papers and artefacts seized from more than 35,000 other ships the English captured between 1652 and 1815. During that period alone, the European powers fought out 14 naval wars in their own waters and on the world's oceans. In 1858 the entire collection comprising several million historical records and objects of many different types and origins was moved to The National Archives (TNA) in Kew, London. Sitting in the archives, the papers and items were all but forgotten for many years.

In the Prize Papers Project, which officially began in 2018, based at the University of Oldenburg and the UK National Archives London and funded within the Academies Programme of the Union of the German Academies of Sciences and Humanities, experts are cataloguing and digitizing the entire Prize Papers collection. The aim of the project is to make the records available to the scientific community and the general public in an open access database, while at the same time conserving the collection in London in its original condition as far as possible. The project is jointly funded by the German government and the federal state of Lower Saxony and is set to run until 2037. Alone the 90 different document types that make up the collection continue to offer new surprises and insights, inspiring historical research in Oldenburg and across the globe. For Oldenburg historian Dr. Lucas Haasis, the notebook belonging to Johann Pohl – or "Jean Pol" as the ship's crew called him – is among the most moving documents he has encountered so far.

"At first glance it looks like a scruffy notebook used for writing exercises," says Haasis, who coordinates the international research cooperations connected with the project. "But on closer inspection, you see that it is much more. For one thing, it shows very clearly that more people were literate or learning to write in the 18th century than has long been assumed – and not just men from bourgeois or aristocratic

In the 17th and 18th centuries, glass beads made in Europe were a popular means of payment and exchange in Africa, and millions of them exchanged hands within the slave trade. In 1803, J.A. de Marrée, a Dutch official, sent the bead necklaces pictured above from Elmina in present-day Ghana to Amsterdam, a centre of glass bead production at the time, as a sample for ordering further supplies (TNA, HCA 32/996).

Small keepsakes were often sent together with letters to family members and loved ones. Silhouette portraits conveyed an impression to those far away of how the faces of relatives or friends were changing over time. In 1780, these silhouettes were sent with a letter from C.L. Scheitz from Steinberg near Flensburg to his brother in Cochin, India (TNA, HCA 30/722).

Bundles of correspondence like this one dating back to 1757, in which a letter contained several other letters, are among the fascinating discoveries in the collection. Letters were often packed together like this for practical reasons, such as to save money on postage, or when several sailors from the same hometown sent messages to their families. Sometimes they were bundled for tactical reasons, with the outermost letter giving instructions for passing on or withholding the documents inside (TNA, HCA 32/249/11).

circles. We find a lot of letters from women and from people from different social classes in the Prize Papers; children wrote letters, and sailors, too. We wouldn't have expected anything on this sort of scale." Since writing skills were not required for seafarers from lower ranks at that time, historians had long assumed that most were barely able to sign their own name. However, the crew of the *Concordia* presents a far more nuanced picture.

The notebook also bears witness to exactly how this man, who was at sea for years, taught himself to write or had others teach him: first he practiced writing individual letters, then monotonous sequences of letters, and finally certain passages of the Lord's Prayer, repeating them over and over again in his notebook. "The practice of learning to write, normally taking place in grammar schools, had made its way on deck – or rather below the deck – of the Concordia," Haasis observes. The traces of wax on the pages of the notebook suggest that Pohl practiced his writing with great assiduousness, working even by candlelight. Why he went to all this trouble is revealed on the last page of the inconspicuous booklet, which contains a little poem he penned for the christening of his baby daughter:

"As a small gift at your christening
remember my dearest daughter
that through me at this time
you will be carried to Jesus Christ."

This is just one of the many unheard voices that have become audible through the sorting and analysis of this unique archive collection, thus deepening our knowledge of those times. Oldenburg historian Professor Dr. Dagmar Freist, who is the project director, also sees the Prize Papers as an opportunity for a shift in perspective: "The major upheavals of European expansion, such as colonialism and poverty-driven migration, are depicted here from the everyday perspective of social groups from which we normally have no testimonies at all. So, our knowledge is not necessarily called into question, but the past appears far more complex and contingent."

Freist, who has been researching and teaching the early modern period at Oldenburg since 2004, describes the Prize Papers as a "treasure trove". Spanning 400 years from around 1450 to 1850, this period was marked by dramatic upheavals, including the invention of printing, European expansion and colonialism, the Reformation and the formation of nation states. She is fascinated by the way the Prize Papers, as an "accidental" archive, provide ever new historical constellations and insights into experiences of migration, disease or slavery in the 17th, 18th and early 19th centuries, depending on the context, time, location, and persons involved. Their diversity, she explains, offers points of departure for historical research in all kinds of areas, including medicine, climate, communication, law, religious plurality, cartography, shipbuilding, and the history of the 19 languages identified in the documents to date.

Whether it's a plea for help from a woman to her husband who has emigrated to America leaving her and their children behind; the letter book of a Jewish merchant driven from the Iberian Peninsula to North Africa, entertaining a huge trade network which his correspondence uncovers, at the same time giving intimate insights into Jewish life 400 years ago; or the reports of Moravian missionaries who had been sent from the German-Danish border region to Suriname – the Prize Papers "demonstrate clearly that this era cannot be understood solely from the national historical perspective that still prevails in research on the European expansion and colonialism", says Freist.

Many of the approximately 160,000 undelivered letters preserved in the Prize Papers collection remain folded or even sealed, some of them shedding centuries-old seeds or the letter sand sprinkled onto the ink to make it dry. As the only means of communicating across large distances, letters played a vital role in helping people to stay in touch. They were often accompanied by a small gift – something familiar sent from home, or something exotic sent home from abroad. In the case of important business documents, several copies were often sent on different ships, Freist adds, in the knowledge that if the vessel was captured, they might not reach their intended recipient. In a letter dated February 27, 1795, Catharina Borck, a 33-year-old Moravian Church missionary born in Flensburg and stationed in Paramaribo, Suriname, wrote to another member of her church:

"Now I hope that (...) all my letters will reach you safely (...), only recently a ship that was on its way here was captured by privateers. They unloaded its cargo and let it sail on without it. They brought one sack of letters, but left the other behind."

Despite the vast distances and the sometimes uncertain, often months-long delivery times, the authors often adopted a chatty tone in their missives. Borck, who ran a small bakery with her husband in the Moravian Church mission in Paramaribo, also treated her correspondence as a "conversation". In a letter dated March 1, 1795, she wrote:

"It is with great pleasure that I once again take up the the quill to converse a little with my dear parents in these few lines."

Nonetheless, the carefree tone of her letters contrasts starkly with their content at times – at least from today's perspective. A letter that raised many questions for historian Freist was also penned by the young Catharina and addressed to Peter, a member of the Moravian Church in Christiansfeld, Denmark. Catharina describes her introduction to plantation society in Suriname, which at the time was a Dutch colony where the use of slaves was commonplace – tens of thousands of enslaved people had been brought there from the west coast of Africa. Three of them worked in Borck's bakery. In her letter to Peter, Catharina describes a visit to a plantation and how its manager had his enslaved workers led into the courtyard to crush coffee beans for the entertainment of his guests:

"It almost looked like soldiers in a drill, except that they were all black. There were probably almost a hundred of them."

For Freist, the missionary's description of the scene is "disconcerting from today's perspective because she seems to have no understanding of the blatant oppression and slave labour being presented to onlookers like a stage production". Instead, she compares the rhythmic movements of coffee-bean crushing with a military drill. Yet as Christians, the Moravian Church missionaries had an ambivalent stance on slavery, Freist explains. "This example shows how challenging it is to contextualize this kind of account and compare it with others in order to understand how slavery was perceived and practiced by Europeans from many different backgrounds and levels of education." There is still a lot of catching up to do when it comes to research on slavery, Freist notes, adding that the most important thing now is to integrate the perspectives


OUS JEAN DAVID, ALEXANDRE BELLEVILLE, NICOLAS BORELY & JEAN-JAQUES CAUVIN, Echevins, Protecteurs & Défenseurs des Privilèges, Franchises & Immunités de cette Ville & Cité de Marseille, Conſeillers du Roi, Lieutenans Generaux de Police, certifions & attestons que
Et parceque (graces à Dieu) la santé est très-bonne en ladite Ville de Marseille, sans aucun soupçon de Peste ni d'autres maladies contagieuses, desquelles nous nous gardons par les précautions les plus rigoureuses; Nous prions tous Gouverneurs, Commandans, Magistrats & Officiers, de laisser sûrement & librement passer, aller & revenir, séjourner & négocier, sans lui donner, ni souffrir qu'il lui soit donné aucun trouble ni empêchement. En témoin de quoi nous avons signé ces présentes, fait apposer à icelles le Sceau de la Ville accoutumé & contresigner par notre Secretaire. Données à Marseille le
du mois de
mil sept cens quarante-sept.
Par mesdits Seigneurs

Pandemic prevention almost three centuries ago: a document in which officials of the city of Marseille certify to Captain Jacques Chermazin and his crew that the city's port was "free from any suspicion of plague or other contagious diseases" upon their departure in February 1747, and request that other authorities therefore give the ship free passage on its way to the then French colony of Saint-Domingue in modern-day Haiti (TNA, HCA 32/94).

of those who were enslaved, and for research to be conducted in collaboration with scholars from the places of origin.

The aforementioned letter is also an example of the unadorned and uncensored insights that the Prize Papers offer. "The content of mail bags became accidental archives," TNA archivists Dr. Amanda Bevan and Dr. Randolph Cock, who work in the project for TNA sorting, write in an article. "A unique survival of mail in transit, in bulk, unmediated by being scattered in delivery, or familial censorship, or the ravages of time." The unique state of preservation of many records, having survived in their original material condition from the past, is another distinctive feature of the Prize Papers. Furthermore, Catharina Borck's letters are a good example of how the Prize Papers can render global microhistories visible, of how such sources can offer intimate perspectives on global circumstances.

"It's so fascinating to be able to zoom in and out," says Haasis, who spent several years on his own microhistorical study, a PhD project on the correspondence of a merchant dating back to the 1740s. "My starting point were the contents of a wooden travel chest, which are stored in their entirety in three of the more than 4,000 archive boxes in the collection. I read and transcribed everything, and then used this as the basis of my analysis," Haasis explains. His focus was on the letter-writing and business practices of Hamburg merchant Nicolaus Gottlieb Luetkens. Through the letters, Haasis was able to follow how Luetkens, who was travelling in France at the time, founded his own merchant house and prepared his marriage – "all through the medium of letters", as the historian emphasizes.

Luetkens' correspondence was one of those chance discoveries. Haasis, like his colleagues Christina Beckers and Dr. Jessica Cronshagen, has been a member of the Oldenburg Prize Papers team since the preparatory phase of the project before its official launch in 2018. He was on his second visit to the National Archives when he came across several boxes full of documents seized from the Hamburg merchant ship *Die Hoffnung*. Haasis describes them as "a time capsule, whose contents were unknown". He took lots of photos so he could read the documents in peace at home. "It was only then that I realized this was a complete archive of letters, and that it all belonged to the same guy!" Galvanized by his discovery, Haasis rushed back to London and "took photos of everything".

"Everything" comprised a complete business archive in which Nicolaus Luetkens had kept all incoming letters and a letterbook with copies of all outgoing letters produced over the course of his two-year business trip along the Atlantic coast. More than 2,400 letters in total had been stored by Luetkens in the wooden travel chest, as well as invoices, outstanding bills of exchange, newspapers, and items of clothing. As Haasis later learned from the court documents, this wooden chest was hidden under a stack of barrels of sugar in the hold of the *Hoffnung* when the ship fell into the hands of privateers on August 23, 1745, on its way from Brest to Hamburg. Now the historian knows: "Luetkens had sent this letter archive, his main asset, to Hamburg with the intention of opening his merchant house there after two years of preparation – and then he lost it all. That's the equivalent of losing a computer together with all the passwords and company secrets today."

But Luetkens' loss is a huge gain for scholars researching the history of letter-writing and business practices. The documents enabled Haasis to not only reconstruct the merchant's journey all the way from Bayonne in the south of France to Brest in the north. Moreover, the historian could observe his practices and tactics throughout the entire process of establishing his merchant firm. And what practices they were! "What we see here are intrigues; how he exploited legal grey zones and used insider trading tactics. Few other mercantile records known to date offer such insights!", Haasis points out. The documents also include personal letters, such as letters to Luetkens' future wife Ilsabe Engelhardt. It's "an absolute privilege", Haasis says, to be able to conduct research on such unique documents. Especially since many of them remained untouched for so long. For the conservators, archivists and photographers in London as well as the team in Oldenburg, preserving the documents in their original historical state is a key priority.

Anyone who will read Luetkens' digitized letters in the Prize Papers database, soon to be online, will also find long-winded, at times pompous-sounding declarations of love, which Haasis' analysis revealed to be set phrases taken from the letter-writing manuals popular at the time. At the end of 1744, Luetkens sent jewellery and other such "trifles" to his "most beloved" to console her for his having to extend his journey. The collection also includes letters securing the financing of business deals or assuring a ship's crew that he would pay a ransom if they were captured in the Mediterranean Sea by privateers of the Ottoman Empire. "The letters spoke, indeed acted on behalf of their author," says Haasis. On May 5, 1744, Luetkens penned the following lines to his brother Anton:

"Since (...) the turmoil of war has given some people reservations about loading cargo onto our ships (...), I had the idea that you should become a citizen (...). Then I would sell you a share in the ships so that you could swear in good conscience (...) that they belong to you."

Being in France, which was at war with England, Luetkens had decided to use his brother as a straw man so that his ships could sail under the neutral flag of Hamburg and thus avoid being captured as "prizes". However, at least in the case of the *Hoffnung*, this strategy failed. But despite such setbacks, he succeeded in founding his own merchant house in Hamburg, married his fiancé in 1745, and even went on to become a senator of the Hanseatic City. His *Beletage* (luxury entrance hall of his villa), with its French gilt furniture, can still be admired today in the Museum für Kunst und Gewerbe Hamburg. It remains unknown to this day, however, whether sailor Johann Pohl from Bremen – after losing his notebook – ever found a way to send his daughter the christening poem he had spent so long learning to write. (ds)

BACKGROUND

The project "Prize Papers. Cataloguing – Digitization – Presentation" is led by the Oldenburg historian Professor Dagmar Freist and funded within The Academies Programme of the Union of the German Academies of Sciences and Humanities, Germany's most comprehensive humanities and cultural sciences research programme, since 2018. The programme currently funds 37 long-term projects. For a prospective funding period of 20 years, the Prize Papers project has been awarded 9.7 million euros, half of which is provided by the German government and the other half by the federal state of Lower Saxony. The project is assigned to the Academy of Sciences and Humanities in Göttingen.

The members of the international Prize Papers team are based in Oldenburg, London and Göttingen. The Oldenburg team led by Professor Freist includes six researchers in various academic posts and ten student assistants. Two archivists and one record specialist are sorting and cataloguing the collection at the National Archives (TNA) in London. In addition, two TNA conservators are ensuring that all items in the archive are preserved in the best possible condition.

As an academic partner, the German Historical Institute London (DHIL) helps with the organization of international conferences and employs the project's two photographers. As an open-access database, the Prize Papers portal will continue to make the digitized documents and artefacts of this vast and unique collection available to researchers as well as interested members of the public. The underlying data structure was developed by the Prize Papers team in collaboration with two IT experts from the headquarters of the Common Library Association (VZG) in Göttingen.

Director of the project Dagmar Freist (fourth from right) and research coordinator Lucas Haasis (third from left) with the Prize Papers team in Oldenburg.

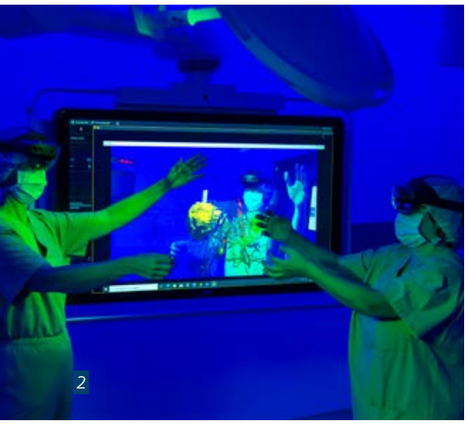
New dimensions in surgery

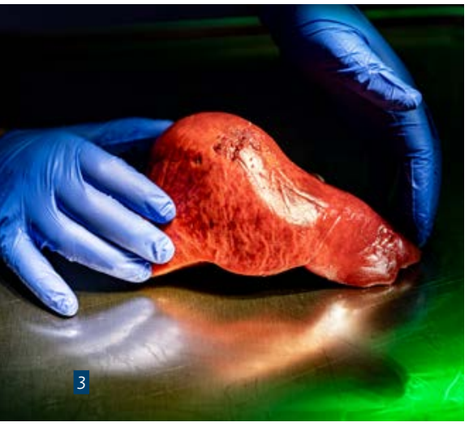
The special lamps in the new operating room at the Pius Hospital feature all the colours of the spectrum, making contrasts such as those between blood and liver tissue easier to see. The surgeons today still have to manually adjust the lighting in the operating theatre while they perform surgery. The partners involved in the SmartOT project are developing an intelligent lighting system that automatically compensates for any shadows.

Dirk Weyhe sees IT and digitalization playing an integral role in the operating rooms of the future. He and his team are working to harness new technologies for surgical procedures

When you enter Operating Theatre 3 of the new central operating department at Pius Hospital Oldenburg, the first thing you notice is the large, three-part mural on the back wall: a dream-like landscape of white dunes, a tranquil sea and blue sky. "We believe that an attractive environment significantly improves the workplace atmosphere," says Dirk Weyhe, Professor of Visceral Surgery at the University and director of the University Clinic for Visceral Surgery at Pius Hospital Oldenburg. And that, he stresses, is indispensable for the success of the operations that are performed here on a daily basis.

However, the atmosphere in the operating theatre is just one aspect of a comprehensive plan to make internal organ surgery safer for patients. Weyhe and his team are integrating various new technologies – from intelligent lighting and voice assistance systems to augmented and virtual reality (AR and VR) – to achieve this goal. Several computers and data cables as thick as arms are embedded in the walls of the new operating theatre, which also features no less than seven strategically positioned monitors and several cameras, as well as a powerful Wi-Fi connection. "Complex human-machine interactions will be integral to the operating theatres of the future," the surgeon explains. Rather than replacing humans, Weyhe believes, technology should complement and optimize their capabilities. He sees potential for new technologies in both the planning and implementation of surgical procedures, as well as numerous applications in medical training and continuing education, including anatomy courses using VR headsets and realistic organ models for practising surgical procedures.





1 Dirk Weyhe and his team are committed to bringing new technologies to medicine.

2 Physicians can use AR headsets to study holograms of organs from all angles, rotate them manually, or move them about. The images can also be viewed on a large screen by medical staff not wearing data headsets.

3 Assistant doctors can train to perform a variety of surgical procedures using lifelike organ models produced with 3D printing.

Weyhe is working with his colleagues Dr. Verena Uslar, Dr. Daniela Salzmann, and Dr. Timur Cetin to turn these plans into reality. The research team at the University Clinic for Visceral Surgery is a partner in various projects for developing and testing new technologies. In addition, the researchers are examining the impact of the innovations on workload and stress levels in operating room staff – a question that has been little researched. "The overarching research topic in our group is patient safety," Weyhe emphasizes. Because for all the top-level expertise, conscientiousness and constant advances in medicine, operations don't always go according to plan – with potentially negative consequences for the patient. Reducing the frequency of such adverse events is the department's declared mission.

Another factor that has received little attention is the lighting in operating theatres. "It's clear that poor illumination of the surgical site can lead to errors, but there are hardly any studies on this," says Weyhe. A typical problem is that doctors and nurses move around during an operation, meaning that the lighting conditions are constantly changing. Weyhe and his team are involved in the SmartOT (Smart Lighting in Operating Theatres) project led by the University of Bremen, which is working to find specialized solutions.

With funding from the German Federal Ministry of Education and Research (BMBF), the project partners are jointly developing a lighting system that eliminates shadows autonomously. Conventional surgical lamps are replaced with light arrays on the ceiling that can be controlled via gestures and voice commands. For fine-tuning, individual sections switch on and off automatically. "This allows the system to be operated in a completely sterile manner," explains Timur Cetin, who leads the Oldenburg subproject. A prototype of the system, which is controlled by sensors, depth cameras and artificial intelligence (AI), will be used in the Pius Hospital's new operating theatre for surgical training, which is due to open its doors by the end of the year. "We have been tasked with creating a system that works in real-life conditions," Cetin says. The research team at the University of Oldenburg analysed the requirements for a smart lighting system at the start of the project and is currently evaluating the usability of the prototypes.

The innovations under development in the VIVATOP project (Versatile Immersive Virtual and Augmented Tangible OP project), which is led by Daniela Salzmann, a clinical scientist at the University of Oldenburg, could bring far more radical changes to the operating room. The researchers in this project, which is also funded by the BMBF, are investigating how virtual reality, augmented reality and 3D printing can be integrated into surgical training, surgery planning and day-to-day surgical procedures at hospitals. The project is led by Professor Rainer Malaka from the Digital Media Lab at the University of Bremen. Weyhe's research group as well as other research institutions and partners from industry are also involved.

Weyhe uses a 3D printed liver to demonstrate where the technology is heading. The model is made of transparent hard plastic. A tumour, several metastases and the boundaries between the various segments of the liver and blood vessels are highlighted in different colours. "What makes this special is that the print is patient-specific," Weyhe says. The model was made using data from a patient's computed tomography scan. "This gives you a much better three-dimensional sense of the location of a tumour than you get from a two-dimensional CT image," he explains. So far doctors have had to construct a three-dimensional image of the organ in their minds, on the basis of the sectional images provided by computed tomography – something that requires a great deal of experience, for example when it comes to detecting abnormalities in blood vessel pathways. In the 3D models produced by the Fraunhofer Institute for Digital Medicine MEVIS in Bremen, abnormalities are apparent immediately. "It is vital to be aware of such vascular variations in preoperative planning," Weyhe emphasizes.

Another technology that doctors aim to use for planning surgical procedures is VR headsets that fully immerse the user in an artificial, three-dimensional world. One of the goals of the VIVATOP project is to enable experts in different locations to come together in a virtual space to view and discuss patient data. The VR headsets used for this purpose feature head-mounted displays and completely cover the eyes. They show an operating room in which wearers can move around and operate various virtual surgical instruments via two remote controls. VR technology can be used for example to simulate the surgical removal of parts of a liver, known as liver resection. The 3D organ model in the virtual world can be rotated and manipulated in real time and also used for detailed planning – such as going through the individual steps of a surgical procedure. In addition, the tool can be used to determine the diameter and volume of tumours or removed liver tissue.

Mixed reality or AR glasses can also be used to view 3D images. The difference is that with these devices the normal environment remains visible. With the HoloLens headsets used in the VIVATOP project, the wearer can rotate, move or enlarge the organ holograms projected into their field of view simply by moving their hands. "We can project these images onto the real organ during an operation to get a better idea of the location of a tumour," says Weyhe, who has already tested the method repeatedly. The software developed for this is already being used successfully in liver surgery, he adds.

The project team is currently working on adding sensors and other technology to lifelike, patient-specific organ models created using 3D printing so that they can be transferred to the virtual world. Users hold and touch the soft models with their hands while looking at the organ through the VR headset at the same time. "I would never have believed it, but the haptic impression greatly enhances mental immersion in the virtual world," says Weyhe.

The VIVATOP team plans to integrate the various technologies into a web-based training programme which, Weyhe believes, could be hugely beneficial in training future surgeons. The team also plans to use realistic organ models as training objects for residents to practise surgical procedures such as electrocautery or high-frequency surgery later on.

Improving understanding of anatomical relationships

VR technologies could also be useful for improving medical students' understanding of anatomical relationships. This was demonstrated in two studies carried out by the team using a virtual "anatomy atlas" developed at the University of Bremen. "The atlas consists of a virtual operating room and a human body," Verena Uslar explains. Users can dissect the model, cut out organs and expose muscles – all in virtual reality.

The researchers selected students from two tenth grade classes with no prior medical knowledge as test subjects. One group was tasked with learning about anatomical relationships in the conventional way, using a textbook, while the other used the VR atlas. "In the first study it was already apparent that the VR group learned faster, made fewer mistakes and had a lot more fun," Weyhe says. In the second study, the team tested how much the students could recall of what they had learned four months earlier – again with significantly better results for the VR group.

In view of all these innovations, Weyhe and his team believe it is also important to consider the impact of human-machine interactions on surgical team. In the case of AI-controlled operating room lighting, the researchers expect the technology to reduce workload and stress. To test whether this is indeed the case, they are using a questionnaire developed by the US space agency NASA known as the TLX score or Task Load Index which measures factors such as mental stress, temporal stress and frustration levels.

The team is also employing neurophysiological methods, for which it is working closely with the University's Department of Neuropsychology headed by Professor Stefan Debener and Dr. Martin Bleichner. The group is among the first one to use a mobile EEG (electroencephalogram) device for measuring brain waves in their daily work. "Together we are establishing a system that can be used to measure the additional stress caused by VR and AR technologies," says Weyhe. Studies using the EEG device are currently in the planning phase. Another project will focus on noise pollution in the operating room – "a huge topic", as Weyhe emphasizes. He considers it a happy coincidence that the Oldenburg neuropsychologists are already studying exposure to noise pollution in daily life, which means that thanks to the portable EEG device they will be perfectly equipped to examine its impact in the operating room, too.

The researchers first realized that new technologies can increase stress in operating room personnel in a study investigating minimally invasive procedures in which camera images from inside the body are transferred to a screen and converted into 3D images via 3D glasses. They found that the procedure causes eyestrain because the 3D image appears to be behind the monitor, and the eyes are forced to constantly adjust to different distances, which is very tiring. "The problem can be easily solved by placing the monitor at least two metres away from nursing staff," Weyhe explains.

This insight was immediately put into practice in the new operating theatre at Pius Hospital – another building block in the quest to create an optimal working environment. (uk)

The sixth sense

Many animals use the Earth's magnetic field for orientation. But exactly how they do this remains for the most part a mystery. In the Oldenburg-based Collaborative Research Centre "Magnetoreception and Navigation in Vertebrates", researchers from various disciplines are working together to solve the puzzle

A wheatear on a stopover in Helgoland. These little songbirds are astonishingly precise navigators, returning to the same nesting place they used the year before after flying up to 15,000 kilometres.

A unique spectacle awaits anyone who visits the German island of Heligoland in the spring or autumn: on some days, particularly after bad weather, thousands of migratory birds including small songbirds such as robins, northern wheatears, chiffchaffs and song thrushes stop to rest on this rocky archipelago in the middle of the North Sea. Some spend the summer in Scandinavia or Russia. A few northern wheatears even fly across the Atlantic to Canada in the warmer months to breed and raise their young. In winter, the birds migrate to warmer climes in southern Europe or Africa. Professor Henrik Mouritsen, who heads the Neurosensory Science research group at the University of Oldenburg, points to a particularly surprising aspect of this phenomenon: "Most songbirds migrate at night. Young birds that have never flown this route before migrate alone, without their parents or siblings," he explains. Northern Wheatears – pretty little songbirds that weigh just 25 grams – cover distances of up to 15,000 kilometres a year. "Their navigation systems are incredibly precise. Experienced migratory birds can find their way back to the exact same burrow they used for breeding the year before after travelling thousands of kilometres," says the biologist. The big question for Mouritsen is how exactly they do this – with a brain that in most cases weighs less than a gram.

Mouritsen has been searching for answers for a long time and his research has made significant contributions to solving the mystery. Since 2019 efforts have intensified. The biologist is working with a large international team in the Collaborative Research Centre (CRC) "Magnetoreception and Navigation in Vertebrates: from biophysics to brain and behaviour", which is conducting in-depth research into the impressive orientation abilities of vertebrates. The focus is on migratory birds such as European robins and blackcaps, and their astonishing ability to use the Earth's magnetic field for orientation. Researchers from a wide range of disciplines including neurobiology, quantum physics, biochemistry, computer modelling and behavioural biology have joined forces in the CRC to find out how this still poorly understood sensitivity to the planet's magnetic field works. Led by Mouritsen, the team is studying the pheno-

The light-sensitive protein cryptochrome 4 (the yellow substance in the tube) is only stable for a short time. PhD student Katharina Görtemaker studies its interactions with other proteins.

Biophysical methods – in this case surface plasmon resonance spectroscopy – can be used to determine whether cryptochrome 4 binds with other proteins.

Another technique used to find interaction partners is the Two-Hybrid System involving petri dishes filled with a nutrient medium.

Numerous tests in the lab are needed to gain insights into the complex biochemical interactions that make magnetic field perception possible.

menon at all levels: analysing migration routes, conducting behavioural experiments and trying to determine how sensory stimuli are processed in the birds' brains and via which cells signals get there. The researchers' mission has brought them right down to the molecular level, where they are investigating the magnetic properties of certain proteins both in the laboratory and using complex computer models.

The team is hot on the trail of a fascinating mechanism: in recent years, evidence has mounted that the magnetic sensor of migratory birds is located in their eyes. Their magnetic sense appears to be based on a complicated quantum physical process that takes place in certain retinal cells. Mouritsen admits that at first glance it is hard to imagine that such a process could form the basis for the magnetic compass in birds. Indeed, it was long considered unlikely that the extremely weak effects of quantum physics could influence biomolecules. However, together with various colleagues the biologist has recently presented several findings that support this theory.

The search for the actual magnetic sensor has already yielded a hot contender: cryptochrome 4, a protein found in the retinas of migratory birds such as European robins, appears to be sensitive to the field lines of the Earth's magnetic field, thus triggering a cascade of chemical signals that transmit the stimulus to the brain. "Cryptochromes are present in the cells of many animals and plants," explains Oldenburg biochemist Professor Karl-Wilhelm Koch, who heads a subproject of the CRC. These proteins, of which there are six different types, can be light-sensitive and, among other things, ensure the functioning of the internal clock. Each animal species has its own, slightly modified variants of these proteins.

Magnetic for a fraction of a second

Cryptochrome 4 has a property that is very rare among biomolecules: "When it meets blue light, so-called radical pairs form," explains Professor Ilia Solov'yov, head of the Quantum Biology and Computational Physics research group at the University of Oldenburg. Radicals are molecules with an unpaired electron. Blue light triggers two such radicals in cryptochrome to form one coherent quantum mechanical state. This state lasts only a few fractions of a second, but during that fleeting moment the protein is sensitive to the relatively weak influence of the Earth's magnetic field. Its direction determines, into which of two possible products the cryptochrome subsequently converts – at least this was the theory put forward by the German physicist Klaus Schulten in the year 2000.

Together with colleagues from Oxford University, an Oldenburg research group led by Mouritsen was recently able to demonstrate this complex process in the cryptochrome 4 protein of the eyes of European robins. The researchers presented their findings in the cover story of a June 2021 issue of the journal Nature. An initial breakthrough came when Jingjing Xu, a doctoral student in Mouritsen's research group, succeeded in producing large quantities of cryptochrome 4 in the laboratory for the first time using bacterial cell cultures. The partners in Oxford were then able to demonstrate the protein's pronounced sensitivity to magnetic fields using ultra-sensitive techniques including magnetic resonance measurements and innovative optical spectroscopy methods. "The authors have brought us ever abiding closer to solving this mystery of sensory biology," zoologist Professor Eric Warrant of Sweden's Lund University commented in Nature.

An important contribution to this success were also the model calculations of physicist Ilia Solov'yov, who specializes in using computers like a microscope to gain a better understanding of molecules. "We calculate the position and motion of all the atoms in a protein using the fundamental equations of nature such as Newton's equations of motion, the laws of thermodynamics and quantum physics," he explains. These modelling operations require enormous computational resources: to model cryptochrome 4 in a realistic cellular environment Solov'yov has to calculate the behaviour of about 100,000 atoms in tiny increments of time. For just one microsecond – a millionth of a second – he needs two weeks of computing time on a powerful supercomputer.

But it's worth the effort: with his "computer microscope", Solov'yov can uncover things that remain hidden using other methods – such as how electrons jump from amino acid to amino acid within the cryptochrome, or how changing environmental conditions affect the process. "The beauty of computer simulations is that we have complete control of the system," he says. In the case of the European robins' cryptochrome, Solov'yov, together with Professors Peter Hore, Christiane Timmel, and Stuart Mackenzie from Oxford, was able to identify which building blocks are crucial for the molecule's magnetic properties, and to confirm this using the proteins made in Mouritsen's group.
Solov'yov is currently modelling the cryptochromes of other organisms such as zebra finches, chickens, blackcaps and fish in order to identify differences in the proteins' magnetic properties. In addition, the physicist aims to measure the life span of radical pairs in various cryptochromes – a crucial property for their suitability as magnetic sensors.

A successful search in gene libraries

While the secrets of this unique protein are gradually being revealed, biochemist Karl-Wilhelm Koch is investigating how the stimulus it provides is transmitted further inside the cells. "The perception of the magnetic field has to be translated into the language of the nervous system," he explains. Koch and his team have set out to find proteins that interact with cryptochrome. "We have identified six potential candidates in genomic libraries," he says. The team presented the results of their genetic screening in the journal Scientific Reports in 2020.

Koch and his team are currently studying two of these proteins in greater detail. One is a visual pigment that is sensitive to red light while the second belongs to an important class of proteins that transmit signals within cells. "We have already found evidence that these two proteins do in fact form a complex with cryptochrome 4 and we are now performing further measurements using special biosensors to better understand these interactions," Koch reports.

The researchers are still puzzling over the significance of these findings. The fact that cryptochrome interacts with a photoreceptor molecule could mean that a magnetic stimulus triggers the same signalling cascade as visual stimuli. The interaction with the second protein, on the other hand, could indicate that the magnetic sensor triggers its own, as yet unknown, signalling pathway. "These are open questions that we aim to clarify," says Koch.

A strong indication that these two proteins do indeed play a role in magnetic sensing is the fact that they are present in the same cells as cryptochrome 4. The research team hadn't specified this as a prerequisite in its search for potential interaction partners. But it emerged that all three proteins are produced in the double cones – a specific type of sensory cells located in the retina. These light-sensitive nerve cells therefore appear to be the site of magnetic sensing.

"Double cones are photoreceptor cells found in fish, reptiles and birds," explains Oldenburg neurobiologist Professor Karin Dedek, who leads a

subproject tasked with deciphering the nerve connections within the retina. These unusually shaped nerve cells consist of a larger principal member and smaller accessory member and make up about 30 to 40 percent of the photoreceptor cells in avian eyes. The CRC team thinks it likely that the cryptochrome molecules are not floating around freely in these cells but are in some way tethered. In the peripheral areas of the photoreceptors there are hundreds of parallel cell membranes. The scientists suspect that the proteins are fixed and aligned in rows here, which would increase their sensitivity to the direction of the magnetic field.

Dedek believes the peculiar geometry of the double cones makes them particularly suited to detecting the magnetic field: "For example, if the cryptochrome molecules in the two subunits are perpendicular to each other, that could aid the process of distinguishing between visual and magnetic stimuli." To understand how the retina encodes the stimuli, Dedek and her colleagues are studying the double cones and their interconnections with other neurons. "We want to know what types of cell then transmit the signal to the brain," she says. Another goal is to directly measure the reaction of the double cones to changes in the magnetic field – and thus provide direct evidence that these cells detect the magnetic field.

Various findings suggest that a region of the brain called Cluster N is responsible for processing the magnetic signals. It is located near the region that processes visual stimuli in avian brains and, as experiments by Mouritsen showed in 2005, is highly active in night-migratory songbirds in light conditions such as low-level star and moonlight. In an article that appeared in Nature in 2009, Mouritsen's research group was able to prove that Cluster N does indeed process magnetic compass stimuli by demonstrating that when this brain region is not functioning, birds can still use their star and sun compasses, but can no longer navigate using magnetic stimuli.

How exactly the birds perceive the Earth's magnetic field is unclear. "The most likely option is that birds see the magnetic field as a visual pattern," Mouritsen says. In laboratory studies, experiments have repeatedly shown that the geomagnetic field helps birds to find their way – and that disturbances can cause them to lose their orientation. But what happens when they are out in the wild is a different matter. Within the CRC, ornithologist Dr. Heiko Schmaljohann is addressing this specific question. "We are looking at whether the results of laboratory experiments are also relevant for free-flying birds," he says.

In recent years, Schmaljohann, who conducts research at the university as well as at the Institute of Avian Research in Wilhelmshaven, has been testing whether electrosmog disrupts orientation in European robins and northern wheatears after their stopover on Heligoland. He began the experiments after a group led by Mouritsen reported in Nature that electromagnetic interference generated by some electronic devices disrupted orientation in caged birds – a result that fits in well with the theory of the radical-pair mechanism. For Schmaljohann, these findings raised the question of whether electrosmog also affects free-flying birds in the wild, such as long-distance migrants, whose populations have long been in decline for reasons that remain unexplained.

Using the sun for orientation

To put this to the test, Schmaljohann and his team set up various radio receiving stations on the island and around the German Bight to track the departure direction of robins and northern wheatears when leaving Heligoland. The researchers then attached radio transmitters weighing 0.3 gram to some 140 northern wheatears and 140 robins and exposed the birds to low levels of electrosmog or no electrosmog at all for several hours. "We then released them and used the radio telemetry data to see how they behaved – whether electrosmog would perhaps prolong their stopover on Heligoland, or whether they would be disoriented when they started flying and head off in the wrong direction," says Schmaljohann. The team is currently in the process of publishing the results of the experiment, and the researcher would only reveal this much: "It appears that the birds use different sources of information to determine the migratory direction from Helgoland. It can be the stars, but also the magnetic field or landmarks."

There have been many indications over the years that the birds don't rely on only a single source of information on their long journey. In addition to stars and landmarks, it is likely that migratory birds use both the sun's trajectory and their sense of smell for orientation. And they probably have a second, even more mysterious magnetic sensor in their beaks, which possibly consists of tiny iron crystals and enables them to use the magnetic field like a map for navigation. This mechanism is being investigated in other subprojects within the Collaborative Research Centre.
Together with Oldenburg computer modellers Professor Bernd Blasius and Dr. James McLaren, Schmaljohann is now investigating which of the various compasses plays the key role on different parts of the journey. "We are putting together individual pieces of information from numerous studies around the world, like a mosaic, to gain a better understanding of global migrations," says Schmaljohann. "After all, if we want to protect these animals on their long journeys, it is important to know what causes some migratory birds to change direction mid-journey and why they react differently to certain stimuli depending on their location."

"Birds definitely face major challenges when navigating across long distances," Mouritsen summarises. Their amazing feats continue to offer many interesting challenges for the CRC team, too. The biologist is confident that more fascinating findings are yet to come: "We have achieved the easy part of our research objectives. Now things will get even more exciting!" (uk)

Doctoral student Vaishnavi Balaji uses a high-resolution confocal microscope to study how neurons inside the retina are interconnected.

Investigating magnetoreception

The Collaborative Research Centre (CRC) "Magnetoreception and Navigation in Vertebrates: from biophysics to brain and behaviour" led by Henrik Mouritsen (photo) has two central objectives: to understand how vertebrates detect the Earth's magnetic field and to investigate what other information birds, fish and bats use for navigation. In five subprojects the focus is on how magnetic signals are detected at the molecular level. Six other projects within the CRC are investigating neural processing of magnetic information and its integration with other relevant cues in the retina and in the brain. One goal here is to find out how the brain links different kinds of sensory information and which areas of the brain represent maps and compass information. In four other subprojects, the main focus is navigational behaviour. The researchers are testing their hypotheses in the lab and in wild free-flying birds and bats and in free-swimming fish. Last but not least, there is a project investigating the genetic basis of migratory behaviour, for example the inherited propensity to migrate that compels many birds to cover vast distances every year. The knowledge gathered in the CRC is important for protecting endangered migratory birds and could also be used to design better sensors or develop quantum computers. In addition to the University of Oldenburg, the Institute of Avian Research in Wilhelmshaven, the Universities of Bochum and Cologne, Oxford University (UK) and the Weizmann Institute of Science in Israel are also participating in the CRC.

Languages provide a piece of home

Languages are often a lot more variable than we imagine, says Slavicist Gerd Hentschel. In this interview the linguist talks about German loanwords in Upper Silesian, language as identity and the efforts of Upper Silesians to gain recognition for their idiom

Professor Hentschel, you research linguistic variations and linguistic contact – in other words what happens when two or more languages meet. What is it about this that fascinates you?
Hentschel: People basically think of languages as closed systems with set rules. But as they are being spoken all the time, they are in constant flux. Even in our Standard German there is much more variation than we imagine. Moreover, a language is situated within social and political contexts and also stands in relation to other languages. The German language has taken over many Anglicisms since the war. This reflects reality. I am less interested in the supposedly strict rules than in the question of how languages develop as a self-regulating system.

One of your areas of research is German loanwords – terms whose expression and meaning can be traced back to the German language. In one project you focused specifically on these Germanisms in Silesian. How did you get interested in this topic?
Hentschel: Loanwords reflect contact between languages. In my very first academic position I researched German loanwords in Polish. The findings from the many years of research I have done in this field have been collated from various projects and integrated into the German loanword portal (Lehnwort-Portal Deutsch) at the Leibniz Institute for the German Language in Mannheim. Some time ago I was contacted by Jolanta Tambor from the University of Silesia in Katowice. She posited that all Germanisms had disappeared from Silesian since 1945. I was not convinced that this was altogether true and suggested that we investigate the matter.

The monograph that you wrote with Jolanta Tambor and your colleague István Fekete was also inspired by the desire to have Silesian recognized as a regional language in line with the European Charter for Regional or Minority Languages. What is special about this language?
Hentschel: We are specifically interested in the idiom spoken by the people of Upper Silesia, in other words the south-eastern part of the historical region of Silesia. We gathered data in the industrial region stretching between Gliwice and Katowice and down to the Czech border in the south, and in the Opole region further to the west. Silesian is a sort of mixed language that combines words as well as, though less frequently, grammatical elements from two languages, German and Polish in the broader sense. Similar hybrid varieties are also found in Belarus and Ukraine, but with strong Russian influences. As far back as the end of the eighteenth century, the German philologist Johann Christoph Adelung held that people speaking Silesian took German words and combined them with Polish endings. There is some truth to this. The historical basis for this argument was a Polish dialect spoken by raftsmen on the Oder River, which is why it is known as "Water Polish". These people had a lot of contact with Germans and as a result Silesian took over lots of German words. "Water Polish" was later re-interpreted to mean "Polish watered down by German".

So for a long time Upper Silesians spoke two or even three languages?
Hentschel: Given that Silesia was under German rule for several centuries, it was a social necessity for people to speak at least some German. The Catholic Church ensured that Standard Polish also had its place. But at home and among "their own kind", people spoke Silesian. Upper Silesia was divided in the aftermath of the First World War, and the eastern part including Katowice went to Poland, which had just regained independence. The west, and cities such as Bytom, which is 15 kilometres away, stayed with the German Reich. The conflict between pro-German and pro-Polish Upper Silesians was bloody, and in some cases fought out among family members and neighbours. In the east, German lost much of its relevance and was replaced by Polish. In the west, the old constellation persisted.

Recognition for the regionality of Silesian?

After 1945 the situation changed completely…
Hentschel: Approximately two-thirds of the current population of Upper Silesia had roots in other parts of Poland prior to 1945. Polish now became the so-called umbrella language, the language used by the authorities and above all the educational institutions. In the early years cultural and educational policies were vehemently anti-German and the German language was prohibited. Today it is only marginally present. Silesian, which was heavily influenced by German, was also frowned upon. Today the situation is a lot more relaxed, although tensions still persist.

How did you go about your study?
Hentschel: We questioned 2,000 people in small groups. The first questions were about identity, about people's socio-biographical background and what they wanted for the Silesian language. We wanted to know what factors encouraged or discouraged their usage of Silesian and Germanisms. And above all, we wanted to find out which Germanisms are still alive and well 70 years after the war. Because today, old-stock Silesians and their descendants subtly incline their linguistic behaviour and choice of expressions towards Silesian or Polish – depending on the communication situation. In contemporary sociolinguistics this is known as style-shifting. Then we selected 700 Silesian words of German origin. We asked how often people used the Silesian word and how often they use its equivalent in Standard Polish instead – even when speaking Silesian. The participants listed their preferences on a scale from one (Silesian only) to seven (Polish only). In linguistics this is known as "subjective frequency" or "frequency estimation".

What did you discover?
Hentschel: First, as regards identity, our study suggests that most respondents identify as both Silesian and Polish. Thus they see their ethno-cultural Otherness as part of the broader spectrum of Polish identity. Only very few of them still don't see themselves as Polish today. So, the Polish nationalist politicians' distrust of old-stock Silesians is unfounded. As regards the words of German origin: almost half of the 700 words we asked about have disappeared or are used only sporadically. Around ten percent are in regular use by all respondents. A good third of them are commonly used but not uncontested. We found no major regional differences – which testifies to a relatively coherent communication space. Only a few Germanisms are particular to certain sub-regions.

The Upper Silesian region is in fact in large parts a conglomerate of towns and cities, similar to the Ruhr. If you don't pay attention to the place names on signs, you won't notice that you are actually passing from one city to the next. Certain Germanisms are only used regularly by the older generation, with younger people often never having heard of them. We also asked to what extent the respondents still used German. Although a third of them said they spoke some German, only a small percentage of them spoke it well. Very few people said that they use German on a regular basis. This means that today direct, intensive contact between Silesian and German is a marginal phenomenon.

Was there anything that particularly surprised you?
Hentschel: We found a very clear bimodal distribution. This means that if individuals still know a Germanism, they generally use it very frequently in Silesian. There were few nuances. We hadn't expected such an unambiguous result because almost all the respondents also speak Polish on a daily basis to a greater or lesser extent. A large percentage of respondents speak Silesian almost as often as they do Polish.

Which Germanisms are used most frequently?
Hentschel: The most commonly used word has just two letters: *ja* (English: yes), which is *tak* in Polish. The word with the meaning "yes" is readily borrowed between languages: even the variant of Belarusian, which is strongly influenced by Russian, uses the Russian word for "yes" but the Belarusian word for "no". Since Upper Silesia is a mining region, mining words are common, quite apart from purely technical terminology. *Gruba*, similar to the German word Grube, is used for "pit" or "shaft", whereas the Polish word is *kopalnia*. For "spectacles", the Silesian is *brele* or *bryle*, which is close to the German Brille, whereas the Polish is *okulary*. For "air" they use *luft*, which is the German word, whereas in Polish it's *powietrze* – just to give a few examples of everyday words.

What factors determine whether a Germanism is still in use?
Hentschel: The key criterion is that if people speak Silesian regularly, then they use more German loanwords. People with a higher education do so to a lesser extent – not for ideological reasons but due to social circumstances. A Germanism will also remain in use longer if it is used in other regional varieties of Polish, although not in the standard language. This is linked to the large number of Poles who have moved to the region. A third important factor is the pronounced Silesian identity. Languages are not just a means of communication, they are also about identity – they provide a piece of home, a sense of belonging. The loss of linguistic diversity in Europe is not just a result of globalization but actually began much earlier with nationalization. Through globalization, in other words the internationalization of political, economic and educational institutions, so-called national languages partially cede areas of functionality to internationally used lingua francas. Democratization and liberalization, by contrast, work in favour of smaller languages.

What do Silesians want?
Hentschel: Basically, just the emancipation of their variety of speech. Almost half of them would like to see Silesian as the second official language. And old-stock Silesians in particular want recognition for its regionality, in all its historical and cultural specificity. And they want more Silesian presence on the radio and television in particular.

What are the conclusions of your research – for example as regards the idea that Silesian should be recognized as a regional language?
Hentschel: If you want to standardize Silesian for this purpose, so it can be used in teaching, reading and dictionaries in school, for example, you could primarily adopt what everyone speaks – words *like ja, gruba, luft*. That would provide a solid foundation. If you don't do this you run the risk that people won't accept the standardized or codified Silesian: a majority is in favour of retaining Germanisms. The Germanisms that have fallen out of use could be left out. But that is ultimately a political question.

What do you hope for?
Hentschel: I have a predilection for little pieces of home. It was my Polish PhD supervisor in Göttingen, Professor Andrzej de Vincenz, who sparked my interest in them. When a sizeable group emerges from an evolved sense of belonging and wants recognition and political support for its idiom, its language, then in a democratic and liberal Europe this should be granted.

Interview: Constanze Böttcher

PUBLICATIONS

The quantitative results of the project are presented in a frequency dictionary:

The aforementioned monograph titled "Das Schlesische und seine Sprecher: Etablierung in der Gesellschaft, Attitüden, Vitalität der Germanismen" will be published soon by the Verlag Peter Lang. The publication was funded by the Federal Government Commissioner for Culture and Media.

Unusual coral nursery

Researchers at the Wilhelmshaven site of the Institute for Chemistry and Biology of the Marine Environment (ICBM) have become the first scientists in Germany to succeed in sexually breeding stony corals in the laboratory. Their work in photos

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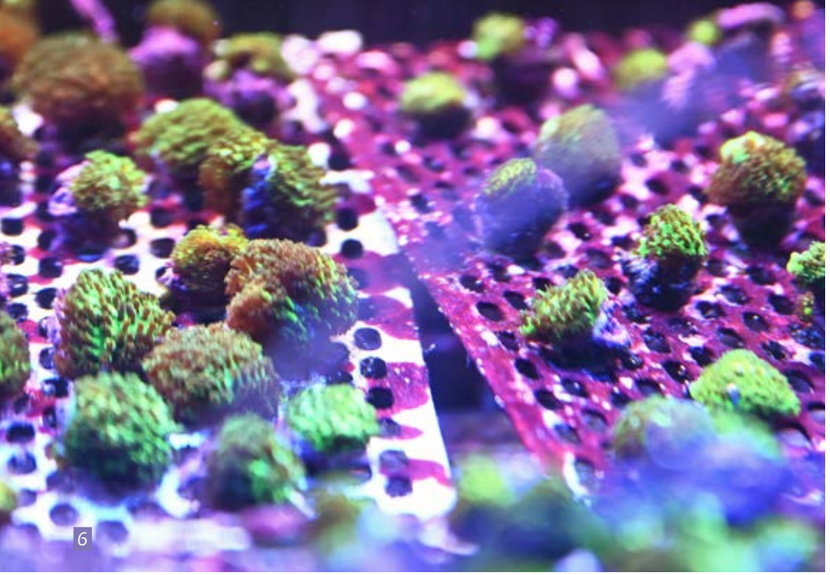
1 *Coral reefs are among the most diverse ecosystems on the planet. But these complex organisms are threatened by anthropogenic climate change and pollution. The hope is that new methods for breeding stony corals can help to reforest damaged reefs.*

2 *Stony corals are colonies of many tiny individual animals, known as polyps, living in a calcium carbonate (limestone) skeleton which forms the backbone of millenia-old reef structures. Currently, the standard method for inducing reproduction in corals in aquariums is fragmentation, an asexual reproduction method in which corals are broken into smaller pieces. The resulting coral fragments grow rapidly but are genetically identical to their parent coral and therefore equally vulnerable to environmental changes such as rising water temperatures.*

3 *Dr. Samuel Nietzer and his team work in a small, ordinary-looking container. It was here that they managed to induce sexual reproduction in the corals and thus produce genetically diverse and potentially more robust offspring.*

4 *Acropora corals, a genus of stony corals, spawn just once a year. In this mass event thousands of these individuals release their egg cells and sperm into the water simultaneously – but only under very specific conditions. For the corals to spawn, environmental conditions such as day length, the lunar cycle and the temperature of the water have to be exactly right. The challenge for the researchers was to simulate these natural conditions in the lab.*

5 *Success came only after a long period of hard work: at precisely the expected time – approximately one week after full moon in December 2020 – the big moment finally arrived and the corals released their eggs and sperm into the water simultaneously. The researchers collected the gametes on the surface of the water and combined the eggs and sperm from different coral colonies in order to ensure the greatest possible genetic diversity in the offspring.*



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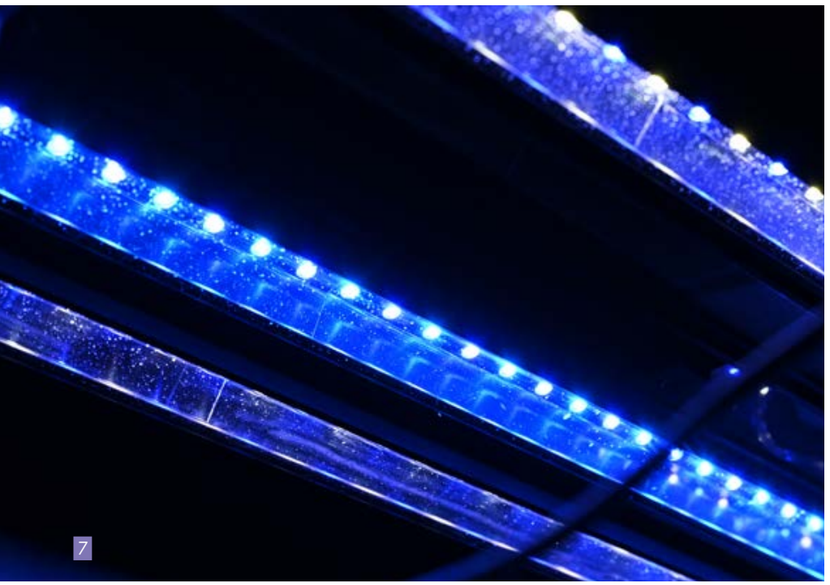

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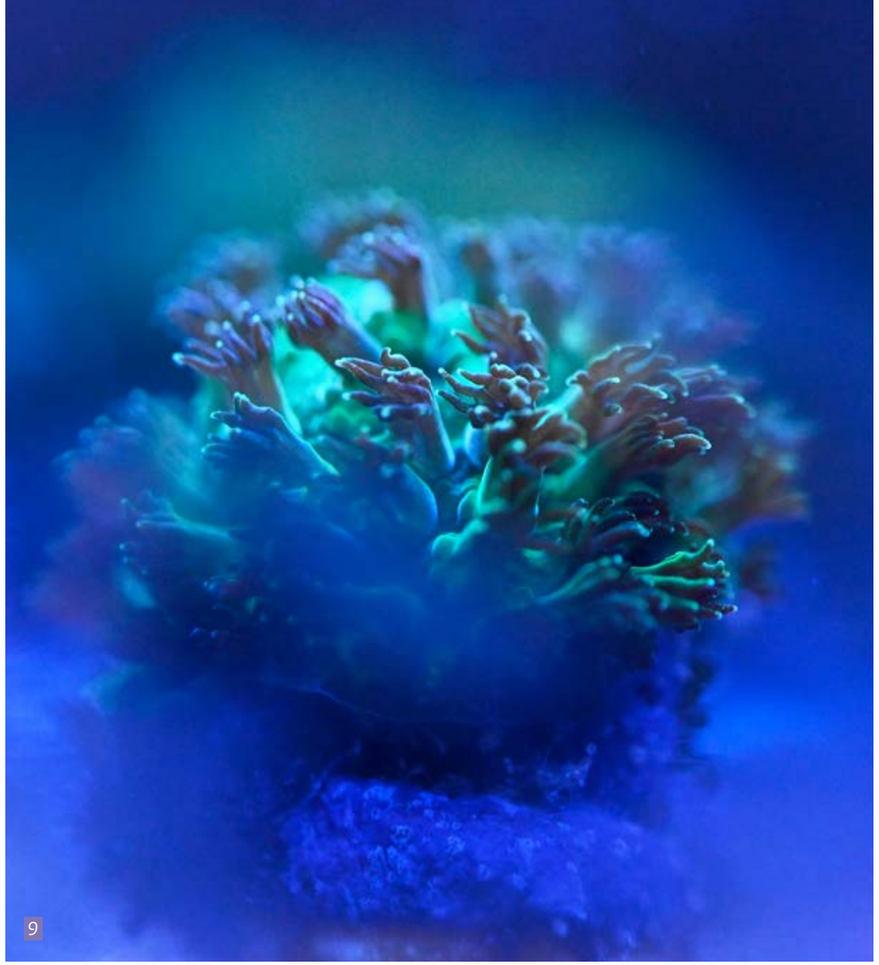

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6 *"We achieved a fertilization rate of almost 100 percent and were able to settle about 50,000 larvae in a few days," Nietzer explained. He reports that several thousand young corals survived the first months.*

7/8 *Facilitating the mass spawning event in the lab is a major technological undertaking. Using specially developed technology, the researchers are able to accurately simulate the environmental conditions of the Pacific Ocean where their mother corals originate from. The team controls the chemical composition of the sea water and simulates lunar cycles, water temperature, lighting levels and day length. Inside the little container on the ICBM site it already gets dark at midday: this is the time when the stony corals sleep.*

9 *By now the largest of the surviving offspring are already several centimetres long. By studying the new larvae and young corals, the researchers hope to pinpoint the factors that induce coral settlement and promote a fast growth.*

10 *To ensure that the corals continue to grow well, Nietzer checks the health of the animals as well as the water quality daily. Key factor is the composition of the nutrients like phosphate and nitrate, as well as the carbonate and calcium content.*

10

Where is history leading us?

When Theodor W. Adorno's "Minima Moralia" were published 70 years ago, it was a sensation. No other intellectual had ever delivered such an excoriating critique of the desolate state of modern society. Reason enough to reread the Frankfurt-born philosopher's scintillating aphorisms

A guest contribution by Helena Esther Grass and Peter Neumann

There are not many philosophical classics that enjoy cult status. Theodor W. Adorno's Minima Moralia, a collection of aphorisms published in 1951, is one such book, even if its author would probably have been less than delighted by its popular appeal. Adorno was not interested in pleasing people. And yet only a few years after the war his "Reflections from a Damaged Life", as the book is subtitled, became compulsory reading in intellectual circles, precisely because of the outrageous tone of the thinking behind it, that refused to continue to be corrupted by the thoroughly false morals of bourgeois society and instead exposed it with zeal.

The book's 153 aphorisms testify to just how 'damaged' life in the mid-twentieth century was. Listed under such evocative yet mysterious sounding key terms as "Grassy seat", "Princess Lizard" and "Tough Baby", Minima Moralia was a collection of highly distilled micro-reflections in which individual, often seemingly trivial accounts of experiences in everyday life, film, the advertising industry and design suddenly flare up under the magnifying glass of critical theory to symbolize an entire epoch. From totalitarianism to the cultural industry or capitalist consumerism, Adorno senses a dangerous and all-pervading tendency towards a total hollowing out of meaning which renders the prospects for humanity and individual happiness deeply precarious. Whatever may once have been good and decent about the bourgeoisie, in Adorno's diagnosis, is now rotten to the core.

One reason for the enduring fascination with Minima Moralia is undoubtedly its literary form. Schooled in the aphoristic art of Friedrich Nietzsche and the fragments of early Romanticism inspired by the biting satire of Karl Kraus, Adorno eschewed the traditional form of the philosophical treatise and embarked on his very own path of poetic thought. The power of Adorno's aphorisms lies not in the meticulously plotted argument, but rather in the fleeting glimpses of things that cannot be captured by concepts, let alone contained in statements of unwavering validity. And just as the early Romantic poet Friedrich Schlegel around 1800 had defended "incomprehensibility" against an Enlightenment overly confident of its triumphs, Adorno now turned to a society trapped in the eternal cycles of bourgeois-capitalist rationality and declared: "Only that which they do not need to know counts as understandable".

Minima Moralia took a long time to be published. Seven years passed between Adorno penning the initial sketches in his diary and the publication of the book, and his reflections were unusually sharp in tone. Aloof, bitter, often disdainful. Many of his early readers not only considered the book too difficult but were also repelled by its open display of moral superiority. Thomas Mann, who shortly after the end of the war warmly recommended the book to his publisher Gottfried Bermann-Fischer in New York, suddenly distanced himself a few months later from his fellow émigré neighbour in California, who had provided him with such invaluable insights into music theory while he was working on Doctor Faustus. While Mann never stopped supporting Adorno's efforts to publish the work, he now criticised the book as "vitriolic, overly caustic, overly intellectual". Bermann-Fischer was also unable to overcome his dislike of Adorno's "extreme cleverness". The manuscript remained shut away in a drawer, its explosive intellectual power initially unrecognized.

When the collection of aphorisms was finally published by the newly founded Suhrkamp Verlag, it was the book of the hour, and Adorno the philosophical media star of a young federal republic on the path to self-discovery. For a generation coming of age, the aphorisms provided the intellectual tools to articulate a stinging critique of the spiritual destitution into which the German post-war public had manoeuvred itself. Bourgeois society, which had not only not prevented National Socialism but had actually abetted and even enabled it, was in the process of re-establishing a foothold. Adorno's book was a loud and clearly audible warning against sleepwalking into a false sense of security.

> **"The only true thoughts are those, which do not understand themselves"**

Minima Moralia refused to comply with people's desire to draw a line under the past. Adorno called attention to the patterns of experience that had not only led to the "Zivilisationsbruch" (civilizational rupture) of Auschwitz but which, after the war, were still firmly entrenched in the society of the Adenauer republic. For Adorno, any talk of an historical zero hour, of a new beginning after 1945 was out of the question. Even a stringent de-Nazification process, he made it very clear, would change nothing. For Adorno, processing the past meant returning time and again to the "suffering" which words could never even come close to describing adequately. "The only true thoughts are those, which do not understand themselves," one of his aphorisms professes. Any reference to the past must also speak to that which has not been processed and which is part of the life history of every individual.

Captivating and merciless in equal parts, over the years this denunciation of the odious self-satisfaction of the West German economic miracle society made of Adorno, who returned to Germany in 1949 and set about rebuilding the Institute for Social Research in Frankfurt, a source of inspiration for the social protest movement that came to a head in the generation of '68 in the US and Europe. Adorno's central slogan – there is no right life in the wrong life – came to have very real consequences, even though he himself remained troubled by the student revolts to the end. As much understanding as he had for the motives of the protest, Adorno regarded any militant action taken by the demonstrators as just another form of totalitarian violence. As Adorno commented in an interview shortly before his death, he had set up a theoretical model, how was he to know that people would seek to realize it using Molotov cocktails? What he was interested in had nothing to do with violent action.

At the heart of the Minima Moralia is a critique of the Enlightenment. This links it with Adorno's earlier work, "Dialectic of Enlightenment", published in 1947. Because one of the core arguments put forward by both Adorno and his congenial colleague Max Horkheimer was that in showing no restraint in its thirst for validity nor restricting itself to particular fields of knowledge, Enlightenment has a tendency to mutate into its opposite: mythology. It becomes a blind, domineering force that quashes its own emancipatory potential. Until all that remains of the Enlightenment's promise to liberate humanity is an endless incremental logic of techno-scientific thinking which not only deprives reason of the space to develop, but lulls it into a false belief in its own freedom. History becomes our doom. Which is why we are called upon to intervene.

His critique is ambiguous in that it clings to the promise of the Enlighten-

ment even as it tries to save it from becoming a perversion of itself. Adorno argues that the Enlightenment, the ability to think for oneself, must be rescued from its exaggerated claims and fatal self-deceptions, which can all be traced back to its origins in antiquity. After the moral catastrophe of Auschwitz, more Enlightenment rather than less was needed to prevent something similar from ever happening again.

It is when we look behind the criticism of the Enlightenment's blinkered belief in progress, however, that the real target of the Minima Moralia emerges. Adorno's 'small ethics' essentially questions whether in the hyper rationalized modern age it is possible even to still speak of a 'right life' when the social framework arrests the proper development of social freedom. Adorno laments that what was once known as 'life' has been utterly corrupted by the magic of the modern commodity world. Whereas in antiquity the 'good life' was universally regarded by philosophical thought as the 'greatest good', today it has been trampled flat by an obsession with reification that has permeated all areas of life. Adorno's most urgent question is this: whether and how 'life' can succeed in a world that systematically shuts out, and in the worst case even destroys, a life worthy of the name?

The legacy of the Enlightenment is still at stake

Even today, more than thirty years after the much-proclaimed 'end of history', the inner connection between Enlightenment and reason, between sovereign freedom and a successful life, is once again up for debate. On the surface, life in the twenty-first century may appear anything but 'damaged'. There can certainly be no comparison with the situation after the end of World War II. Yet the spread of Covid-19 has exposed just how porous the moral varnish of a public that considers itself enlightened really is. Authoritarian regimes and far-right parties are celebrating victories all around the world by questioning the achievements of the scientific community and deliberately ignoring or even wilfully distorting rational arguments in the name of 'free' thinking.

Seen in the context of these gloomy and even ominous prospects, Adorno's "Reflections from a damaged life" have lost nothing of their tremendous relevance even seventy years on. The legacy of the Enlightenment is still at stake. Jürgen Habermas, the successor of the critical theory founded by Adorno and Horkheimer in particular, once referred to this as "the unfinished project of modernity". The question of where history is headed – if indeed it is headed in only one direction and at only one speed these days – is more crucial today than ever.

BACKGROUND

The Adorno Research Centre is an interdisciplinary research network. Founded in 1996 by sociologist Prof. Dr. Stefan Müller-Doohm, since 2007 it has been based at the Institute of Philosophy and headed by Prof. Dr. Johann Kreuzer. The aim of the centre is to link the various research activities on Adorno, Walter Benjamin and critical theory with the goal of enriching the discourse on Adorno's work and providing inspiration for further research. It inquires, for example, into the relevance and diagnostic power of Adorno's thinking for today's world. First published in 2011, the research centre's "Adorno Handbook" plays a critical role here. A second extended and updated edition is now available. The Adorno Research Centre also offers seminars on classic works of critical theory as well as contemporary related topics. They are open to anyone interested in such topics. The network also organises specialist international conferences – such as the one held in November at the Oldenburg Kunstverein to commemorate the 70th anniversary of Minima Moralia.

uol.de/en/adorno-forschungsstelle

Everyday noise, socially acceptable cameras and complex series

Three researchers have been awarded prizes by the Universitätsgesellschaft Oldenburg e.V. (UGO) this year: neuroscientist Dr. Martin Bleichner won the Award for Excellent Research endowed with 5,000 euros, while computer scientist Dr. Marion Koelle and mathematician Dr. Ingo Schoolmann each received an Outstanding Doctoral Thesis Award, which is endowed with 2,000 euros

UGO Award for Excellent Research

Neuroscientist Dr. Martin Bleichner has been a lecturer and researcher in the Psychology Department for eight years. For the past two years, the 40-year-old has led the “Neurophysiology of everyday life” research group as part of the German Research Foundation's Emmy Noether Programme. The project aims to study brain activity in response to environmental noise and objectify the subjective noise disturbance. To do this Bleichner’s team uses mobile electro-encephalography, placing electrodes around the ear in combination with a signal amplifier to record electrical activity in the brain. The collected data is then combined with the noise that is recorded simultaneously via smartphone. Bleichner studied cognitive science in Osnabrück and cognitive neuroscience in Utrecht in the Netherlands, where he also earned his PhD.

UGO Award for Outstanding Doctoral Thesis

In her dissertation "Designing socially acceptable body-worn cameras”, computer scientist Dr. Marion Koelle combines empirical user research, design, software and hardware prototyping of cameras with aspects of artificial intelligence. Her focus here is the social component of human-machine interactions, with the aim of designing technology that fits seamlessly into people's day-to-day social life. She has received multiple awards for her work, including the Helene Lange Prize in 2020, jointly awarded to young scholars by the EWE Foundation, OFFIS – Institute for Information Technology and the city of Oldenburg. Koelle transferred to the University of Oldenburg in 2016 and completed her PhD under the supervision of Prof. Dr. Susanne Boll. Recently she has been conducting research at Saarland University into technologies worn directly on the skin that are sustainable, aesthetic and non-stigmatizing.

UGO Award for Outstanding Doctoral Thesis

Dr. Ingo Schoolmann is the first mathematician to receive the UGO Prize for Outstanding Doctoral Thesis. His work focuses on long-standing unsolved mathematical problems. His doctoral thesis “Hardy spaces of general Dirichlet series and their maximal inequalities” garnered much attention in the world of mathematics. The thesis combined subfields of analysis – such as functional analysis, abstract harmonic and complex analysis – and “opened a window that had been closed for decades” on the theory of general Dirichlet series, as his PhD supervisor Prof. Dr. Andreas Defant emphasized. Schoolmann did a teaching degree in Oldenburg in mathematics, politics and economics before completing his Master's in mathematics in 2016. He completed his doctoral thesis, which was funded by the German Research Foundation, in February 2021 with summa cum laude honour. The 30-year-old is currently working as a software developer.

Alexander Arlt

Internal Medicine – Gastroenterology

Prof. Dr. Alexander Arlt has been appointed Professor of "Internal Medicine" with Special Focus on Gastroenterology at the Department of Human Medicine. Arlt is also Director of the University Clinic for Internal Medicine - Gastroenterology at the Klinikum Oldenburg. Before coming to Oldenburg, he was Deputy Director of the Clinic for Internal Medicine I at the Kiel campus of the University Hospital Schleswig-Holstein (UKSH). Arlt studied human medicine at the University of Kiel. After obtaining his medical licence in 2002 he worked as a research assistant and junior doctor at the UKSH's Department for General Internal Medicine. In 2007 he earned his habilitation with a thesis on pancreatic cancer and completed his specialist training in internal medicine in the same year. In 2009 he became a consultant at the UKSH's Clinic for Internal Medicine I, and in 2012 its medical director. During this period, he earned additional qualifications in gastroenterology and intensive care medicine. In 2013 he was appointed Associate Professor and took up the position of Senior Consultant at the clinic, becoming Deputy Director in 2019.

Doreen Brandt

Low German Literature

Dr. Doreen Brandt has been appointed Junior Professor of "Low German Literature in Historical and Cultural Studies Perspectives" at the Institute of German Studies. She was previously a research assistant at the Universities of Rostock and Göttingen. Brandt studied history and German studies at the University of Rostock. She completed her Master's degree there in 2009 and then became a lecturer and research assistant and earned her doctorate in German medieval studies in 2017. In her dissertation, Brandt examined how event-related poetry and songs were handed down through the generations in the transition from the Late Middle Ages to the Early Modern period. In a project funded by the German Research Foundation (DFG) at the University of Rostock, Brandt worked on the analysis and digital edition of 16th century collections of sayings in Low German. She also designed a Centre for the Regional History and Culture of Mecklenburg, and worked at the University of Göttingen's Seminar for German Philology. Brandt's research interests include Middle Low German literature, 13th century Minnesang and literary historiography.

Gerald Enzner

Speech Technology and Hearing Devices

Dr. Gerald Enzner has been appointed Professor of "Speech Technology and Hearing Devices" at the University of Oldenburg's Department of Medical Physics and Acoustics. He previously headed the teaching and research area "Adaptive Systems of Signal Processing" at the Faculty of Electrical Engineering and Information Technology at Ruhr-University Bochum. Enzner studied electrical engineering at the University Erlangen–Nürnberg. After study visits to the Eindhoven University of Technology (the Netherlands) and Siemens Corporate Research (New Jersey, USA), he became a research assistant at RWTH Aachen University, where he also completed his doctorate in 2006. In 2013, Enzner habilitated in the field of adaptive systems in signal processing. At the University of Oldenburg, Enzner will conduct research and teaching aimed at improving speech signals in complex acoustic settings (with ambient noise or reverberations) at the newly established Speech Technology and Hearing Devices Centre. This includes, in particular, binaural modelling and processing of speech using adaptive signal processing and machine learning methods.

New Appointments

Katharina Hombach

Accounting and
Corporate Governance

Prof. Dr. Katharina Hombach has been appointed Professor of "Accounting and Corporate Governance" at the Department of Business Administration, Economics and Law. She was previously an assistant professor at the Frankfurt School of Finance & Management. Hombach studied business administration at the Frankfurt School of Finance & Management and corporate law and accounting at the London School of Economics and Political Science. After holding various research positions, she completed her doctorate at the WHU - Otto Beisheim School of Management. A key focus of Hombach's scientific work is the economic analysis of corporate transparency, with a special emphasis on disclosure regulations and their economic impact. The expert for financial reporting was recently appointed by the government of Lower Saxony as a new member of the Commission for the determination of the financial needs of public service broadcasters in Germany (KEF).

Gero Junike

Actuarial and
Financial Mathematics

Dr. Gero Junike has been appointed Junior Professor of "Actuarial and Financial Mathematics" at the Institute of Mathematics. The professorship is funded by Oldenburg business enterprises and organizations. Before moving to Oldenburg, Junike worked in risk management at a Düsseldorf-based financial services company. He studied mathematics at the TU Braunschweig. Following his Master's degree he first worked as a risk manager at HSBC investment bank in Düsseldorf and then enrolled at the Autonomous University of Barcelona, where he completed his doctorate with a thesis on advanced stock price models. Junike also conducted research as a visiting scholar at KU Leuven (Belgium), in the Statistics and Risk working group led by Professor Wim Schoutens. Most recently, Junike worked at the financial services company Finovesta, where he developed algorithmic trading strategies. His current research focuses on mathematical modelling of financial markets. Among other things, he is investigating how investors can build up cost-efficient portfolios despite the uncertainties of the market models.

Martin Könneke

Benthic Microbiology

Dr. Martin Könneke has been appointed Professor of "Benthic Microbiology" at the Institute of Chemistry and Biology of the Marine Environment (ICBM). He previously led a research group at MARUM – Center for Marine Environmental Sciences at the University of Bremen as a fellow of the renowned Heisenberg Programme of the German Research Foundation (DFG). Könneke studied biology at the Technical University of Braunschweig. He then conducted research at the Max Planck Institute (MPI) for Marine Microbiology in Bremen and received his PhD from the University of Bremen in 2001. After a research stay at the University of Washington, Seattle (USA), Könneke moved to the ICBM in 2005. He returned to Bremen to the MPI in 2011 and then moved on to the university in 2012. In 2014, the microbiologist earned his habilitation in Oldenburg, and from 2016 he established the Heisenberg group at MARUM. Könneke's research focuses on the role that previously uncharacterized microorganisms living in marine sediments play in the cycling of elements in the oceans. He also develops methods to isolate previously unknown microbes from seawater and cultivate them in the laboratory.

Anna Langenbruch

Cultural History of Music

Dr. Anna Langenbruch has been appointed Professor of "Cultural History of Music" at the Institute of Music. She previously led a junior research group at the university that investigates the topic "Music History on Stage" and is funded by the Emmy Noether Programme. Langenbruch studied music and mathematics in Cologne. She completed her bi-national doctorate at the Hanover University of Music, Drama and Media and the École des Hautes Études en Sciences Sociales Paris (France) in 2011, then took up a research post at the University of Oldenburg in 2012, where she was awarded a Carl von Ossietzky Researchers' Fellowship in 2013. The university funding programme enabled her to successfully apply for the German Research Foundation's Emmy Noether Programme, through which she established her own research group. Langenbruch's research interests include the cultural history of exile and migration and music theatre from the eighteenth to twenty-first century. Most recently, she has been investigating the ways in which music history has been presented on stage in operas, operettas, musicals or plays with music.

Miriam Liedvogel

Ornithology

Dr. Miriam Liedvogel, an evolutionary biologist, has been appointed Professor of "Ornithology" at the Institute of Biology and Environmental Sciences. She is also the new Director of the Institute for Avian Research 'Vogelwarte Helgoland' in Wilhelmshaven. She previously led an independent research group at the Max Planck Institute for Evolutionary Biology in Plön. Liedvogel studied biology at the Humboldt-Universität, in Heidelberg and in Oxford (England), where she graduated with a Master's degree in Integrative Biosciences. In 2002 she moved to Oldenburg and completed her PhD there in 2006 with a thesis on orientation mechanisms in migratory birds. She then held postdoctoral research positions at the Universities of Oxford, Lund (Sweden) and Freiburg. In 2014, she moved to the Max Planck Institute for Evolutionary Biology, where she used blackcaps as a model system for studying the genetic architecture of migratory behaviour. She combines exact characterization of migratory behaviour in the field and under controlled laboratory conditions with cutting-edge sequencing methods to investigate the molecular foundations of bird migration.

Johannes Lorenz

Business Taxation

Dr. Johannes Lorenz has been appointed Junior Professor of "Business Taxation" at the Department of Business Administration, Economics and Law. He was previously a postdoctoral researcher at Paderborn University's Chair of Business Administration. Lorenz studied business administration and economics at the University of Passau, where he also completed his doctorate in 2017. In the same year he was appointed as a tax advisor by the Munich Chamber of Tax Advisors. After working as a research assistant and senior lecturer at the University of Passau's Chair of Business Administration with a Focus on Taxation, Lorenz was an associate at the Munich-based law firm Flick Gocke Schaumburg, which specializes in commercial law, from 2018 to 2020. He then took up a research associate post at Paderborn University. Lorenz's research interests include the impact of taxation on the decisions of companies and individuals in interaction with strategically acting tax authorities, with a particular focus on (international) tax avoidance and tax complexity.

Astrid Petersmann

Clinical Chemistry
and Laboratory Medicine

Dr. Astrid Petersmann has been appointed to the Professorship for "Clinical Chemistry and Laboratory Medicine" at the Department of Human Medicine. She is also Director of the University Institute for Clinical Chemistry and Laboratory Medicine at the Klinikum Oldenburg. She was previously Medical Director of the Interdisciplinary Laboratory and Acting Director of the Institute of Clinical Chemistry at the University Medical Centre Göttingen. Petersmann studied biology at the University of Hannover and human medicine at Hannover Medical School and the University of Greifswald. She completed her medical studies while serving in the German Armed Forces, where she rose to the rank of Stabsarzt (Captain Dr.). After earning her doctorate, Petersmann worked at the Institute of Clinical Chemistry and Laboratory Medicine in Greifswald and became senior consultant there in 2014. Following her specialist training she earned her habilitation in 2017 with a paper on the quality of laboratory medicine examinations and then moved to Göttingen in 2019. Her research focuses on improving the quality of laboratory analyses and establishing new analytical methods.

Bernhard Rauch

Pharmacology

Prof. Dr. Bernhard Rauch has been appointed Professor of "Pharmacology" at the Department of Human Medicine. He was previously Acting Head of the Department of General Pharmacology and Acting Managing Director of the Institute for Pharmacology at Greifswald University Hospital. Rauch studied human medicine at the Universities of Düsseldorf and Texas (USA). After obtaining his licence to practise medicine in 2000, he worked at the Institute for Pharmacology and Clinical Pharmacology of the Heinrich Heine University Düsseldorf until 2011, initially as a research assistant and later as a research associate and senior lecturer. He is a specialist in pharmacology and toxicology, as well as clinical pharmacology. In 2011, he took up the professorship in pharmacology and toxicology at the University of Greifswald. Rauch's research focuses on cardiovascular and oncological pharmacology. Among other things, he studies inflammatory processes and the function of blood cells and blood coagulation and investigates their pharmacological alterations in cardiovascular and tumorous diseases.

Jan Sauermann

Modern Political Theory

Dr. Jan Sauermann has been appointed Professor of "Modern Political Theory" at the Institute of Social Sciences. He was previously a research associate at the Chair of Comparative Political Science at the University of Cologne. Sauermann studied economics in Cologne. After a period as a research assistant at the Chair of Comparative Political Science and a research stay at New York University (USA), he completed his doctorate in 2010 in the International Max Planck Research School on the Social and Political Constitution of the Economy programme in Cologne. He then took a post as a postdoctoral researcher at the Cologne-based Max Planck Institute for the Study of Societies, before returning to the University of Cologne as a senior lecturer. Sauermann's research focuses on how groups can achieve common goals and how they reach joint decisions. In particular, he is investigating new coordination mechanisms and the question of how social preferences influence decision-making.

Daniel Sonntag

Applied Artificial Intelligence

Dr. Daniel Sonntag has been appointed to the Endowed Chair of "Applied Artificial Intelligence" at the Department of Computing Science. The chair is funded by Oldenburg-based business enterprises and organizations. Sonntag was previously a research group leader at the German Research Centre for Artificial Intelligence (DFKI) in Saarbrücken. In his capacity as professor he will establish a new research group focused on interactive machine learning at the DFKI's Oldenburg location. Sonntag studied computer science and linguistics in Saarbrücken, where he also earned his PhD in 2008. He began working as a research assistant at the DFKI in Saarbrücken in 2004, and became a Research Fellow at the institute in 2016. He has also taught at Saarland University and the Technical University of Kaiserslautern. Sonntag is editor-in-chief of the German Informatics Society's German Journal of Artificial Intelligence and of the book series Cognitive Technologies, published by Springer-Verlag. His research focuses on interactive machine learning – in which computers receive human feedback as they collect data – and its potential uses in industrial and medical applications.

Heike Wehrheim

Theoretical Computer Science

Prof. Dr. Heike Wehrheim has been appointed Professor of "Theoretical Computer Science: Formal Methods" at the Institute of Computer Science. She was previously Professor of Specification and Modelling of Software Systems at Paderborn University. Wehrheim trained as a mathematical-technical assistant at the Gesellschaft für Mathematik und Datenverarbeitung (GMD) in St. Augustin, near Bonn. After studying computer science at the University of Bonn, she completed her doctorate at the University of Hildesheim in 1996. From 1998 to 2004 she was a research assistant and then research associate at the University of Oldenburg, where she also earned her habilitation in 2002. She took up the professor position at Paderborn University in 2004. Wehrheim's research focuses on mathematical methods for formally verifying the correctness of computer programmes. Before moving to Oldenburg, she was the deputy speaker of a German Research Foundation Collaborative Research Centre based at Paderborn University.

Gundula Zoch

Sociology of Social Inequalities

Dr. Gundula Zoch has been appointed Junior Professor of "Sociology of Social Inequalities" at the Institute for Social Sciences. Previously, she was a research assistant at the Leibniz Institute for Educational Trajectories in Bamberg. After completing a degree in sociology and in economics in Leipzig and London, she was employed as a research assistant at the German Institute for Economic Research (DIW) in Berlin. Afterwards, she held a doctoral fellowship by the Bamberg Graduate School of Social Sciences, funded by the German Excellence Initiative. In 2018, she received her PhD with distinction from the University of Bamberg. In her research, Zoch is concerned with the emergence and consequences of social inequalities in employment and family work. Her empirical analyses of large longitudinal surveys such as the National Educational Panel Study (NEPS) focus on persisting differences between East and West Germany, for example in maternal employment or in the prevailing role models. In her current externally funded projects, she is investigating the effects of the Corona pandemic.

Fakultät I – Bildungs- und Sozialwissenschaften

SVEN BROSCHINSKI, Thema: „Dynamiken von Lohnungleichheiten in Europa. Betriebliche und arbeitsmarktpolitische Anpassungen während der Eurokrise“
Sozialwissenschaften

JULIA EGBERS, Thema: „Erfahrungen bei Auslandsaufenthalten und deren Einfluss auf die Bewältigung von berufsrelevanten Herausforderungen in internationalen Klassen“ Pädagogik

NANKE GABRIEL KRIEGHOFF, Thema: „Nach der Diagnose war es ein Wechselbad der Gefühle … – Erleben und Bewältigungsverhalten von Menschen, die im Erwachsenenalter eine Diagnose aus dem Autismus-Spektrum erhalten haben“
Sonderpädagogik

MAXIMILIAN LUTZ, Thema: „Decision Making in Democratic Regimes of Redistribution“ Sozialwissenschaften

KATHARINA MEYER, Thema: „Der Nationalsozialismus aus der Perspektive Jugendlicher in Deutschland über 70 Jahre danach“
Pädagogik

NIKIAS SEBASTIAN OBITZ, Thema: „Selbstorganisation von sozial benachteiligten Kindern und Jugendlichen in Kolumbien: Möglichkeiten und Perspektiven von Partizipation“ Pädagogik

SYBILLE SEYBOLD, Thema: „Die Entwicklung des Kommunikationstrainings ZAK – Zusammen Aktiv Kommunizieren – für Erwachsene mit Hörbeeinträchtigung und ihre Bezugspersonen“ Sonderpädagogik

SASKIA STEREL, Thema: „Lesen und Leseunterricht in der Berufsfachschule. Empirische Untersuchung zur Perspektive von Berufsfachschullehrpersonen auf Lesefähigkeiten von Berufslernenden aus dem Berufsfeld ‚Gesundheit und Soziales‘“ Pädagogik

PEER TAMM, Thema: „Deutungsmuster und Handlungsorientierungen von Studierenden an der Fachschule für Sozialpädagogik – Eine qualitative Analyse von Facharbeiten“
Pädagogik

Fakultät II – Informatik, Wirtschafts- und Rechtswissenschaften

RENATA CURZEL, Thema: „The TRIPS Agreement Balancing Incentives to Research and Access to Medicines – The Participation of the Brazilian National Health Surveillance Agency (ANVISA) in the Patent Grant Proceedings: A Model for Controlling Pharmaceutical Patents?“
Wirtschafts- und Rechtswissenschaften

TINA FLETEMEYER, Thema: „Berufsbezogene Überzeugungen von Lehrpersonen zur Beruflichen Orientierung an allgemeinbildenden Schulen. Eine qualitative Interviewstudie an niedersächsischen Gymnasien und kooperativen Gesamtschulen“
Ökonomische Bildung

STEPHAN FRIEBEL-PIECHOTTA, Thema: „Vorstellungen von Wirtschaftslehrpersonen zum Modelldenken im Ökonomieunterricht“ Ökonomische Bildung

RAPHAEL HOFFMANN, Thema: „Profilbildung unter der DSGVO – Digitale Persönlichkeitsprofile im Spannungsfeld zwischen Unternehmensinteresse und Persönlichkeitsrecht“
Wirtschafts- und Rechtswissenschaften

CHRISTINA FELIX KIFUNDA, Thema: „The Role of Gender in Supporting Livelihoods through Urban and Peri- Urban Agriculture: The Case of Kinondoni Municipality in Dar es Salaam City, Tanzania“
Wirtschafts- und Rechtswissenschaften

CHRISTINA KOHLEPP, Thema: „Die Verbundenheit des Kunden mit dem Konsumgüterunternehmen“
Wirtschafts- und Rechtswissenschaften

SEBASTIAN LOUVEN, Thema: „Kartellrechtliche Innovationstheorie für digitale Plattformen“
Wirtschafts- und Rechtswissenschaften

THERESA ANNA MICHEL, Thema: „Resilienz-Lernen in Partizipationsprozessen für den Umgang mit lokalen Klimafolgen“
Wirtschafts- und Rechtswissenschaften

ANTON MYSEGADES, Thema: „Rechtliche Möglichkeiten des Einsatzes von Smart Contracts zur Digitalisierung und Automatisierung von Verträgen“
Wirtschafts- und Rechtswissenschaften

HEINRICH ODY, Thema: „Monitoring of Traffic Manoeuvres with Imprecise Information“ Informatik

THILO REICHENBACH, Thema: „Erfolgsfaktoren im Online-Fundraising“
Wirtschafts- und Rechtswissenschaften

JOHANNES ROLFS, Thema: „Zulässigkeit der Auswertung von Datenbanken durch Metasuchmaschinen“
Wirtschafts- und Rechtswissenschaften

ROBERT SCHIPPEL, Thema: „Gewährleistung von Datensicherheit und Datenschutz im eVergabe-Verfahren“
Wirtschafts- und Rechtswissenschaften

MUSA NKUBA SHELEMBI, Thema: „Commercial Farming Models, Smallholder Farmers’ Choices and Sustainability in the Highlands Agro-Ecological Zone in Njombe District, Tanzania“
Wirtschafts- und Rechtswissenschaften

DAVY VERCRUYSSE, Thema: „Sex and Gender Perspectives in Entrepreneurship Education Research“
Wirtschafts- und Rechtswissenschaften

PAUL VOIGT, Thema: „Die räumliche Awendbarkeit der EU Datenschutz-Grundverordnung auf Auftragsverarbeiter im Drittland“
Wirtschafts- und Rechtswissenschaften

Fakultät III – Sprach- und Kulturwissenschaften

CHRISTINE FORNOFF-PETROWSKI, Thema: „Künstler-Ehe. Ein Phänomen der bürgerlichen Musikkultur“ Musik

ELENA ROMANA GASENZER, Thema: „Historische Musikermedizin: Beiträge zur Neubewertung künstlerischen Schaffens in Geschichte und Gegenwart“ Kunst und Medien

IMKE GIRSSMANN, Thema: „Hauptstadt unserer Erinnerungskultur? Repräsentationen von Gedenken und Identität in der Mitte Berlins des Denkmals für Freiheit und Einheit und des Denkmals für die im Nationalsozialismus verfolgten Homosexuellen“ Materielle Kultur

TERESA GRIMM, Thema: „Psychophysiologische Auswirkungen musiktherapeutischer Interventionen bei Menschen im Wachkoma“ Musik

CAROLIN KRÄMER, Thema: „Museumsbilder – Perspektiven Mitarbeitender an ehrenamtlich betriebenen Ortsmuseen in Niedersachsen und das museale Feld und dessen Akteur_innen“
Materielle Kultur: Textil

VERENA LIU, Thema: „Musikpädagoginnen als Unternehmerinnen im späten 19. Jahrhundert“ Musik

FABIAN NATTKÄMPER, Thema: „Kulturbezogenes Lernen im Niederländischunterricht“ Niederlandistik

SARAH OLTHOFF, Thema: „Herausforderung Passiv. Die Verwendung des werden-Passivs in schul- und alltagssprachlichen Texten und die von Schüler*innen der Sekundarstufe I empfundene Herausforderung bei dessen Rezeption“ Germanistik

ANCA UNERTL, Thema: „Das Berufsfeld ‚Orchestermusiker_in‘ im musikhistorischen Kontext – Kulturpolitische Betrachtungen der Entwicklung künstlerischer Ausbildung in Deutschland von 1930 bis heute“ Musik

MIRJAM WILHELM, Thema: „Vjera Biller (1903-1940) und das Kindliche – Entwürfe von Künstler*innenschaft in den Avantgarden der 1920er Jahre zwischen ‚Balkanisierung‘ und ‚Barbarisierung‘“
Kunstwissenschaften

Fakultät IV – Human- und Gesellschaftswissenschaften

CARINA AMBOS, Thema: „Unter allen Umständen vergiß nicht deine Bibel… Die kirchliche Betreuung von Auswandernden in Bremen und Bremerhaven im 19. Jahrhundert als konfessionelles Begegnungs- und Konfliktfeld“
Ev. Theologie/Religionspädagogik

Fakultät V – Mathematik und Naturwissenschaften

JANIS AHRENS, Thema: „Nutrient and trace metal cycling in beach sediments and its constituent fluxes across the sediment-water interface“
Marine Umweltwissenschaften

NICOLE AHRENS, Thema: „Functional analysis of Zebrafish specific opsin-kinases (zGRKs)“ Biologie

ABDALLATIF ALSHALFOUH, Thema: „Interactions of single nanoparticles with microelectrode surfaces (Wechselwirkung einzelner Nanopartikel mit Oberflächen von Mikroelektroden)“ Chemie

EMRE BABAOGLU, Thema: „Darstellung von Mediatoren für elektrochemische Reaktionen und Iod-mediierte Synthese von 2H-Azirin-2-Carboxylaten“ Chemie

MALTE BEHR, Thema: „Quasihomogeneous Blow-Ups and Pseudodifferential Calculus on SL(n, R)“ Mathematik

PASCAL BÖWER, Thema: „Hochdetaillierte Simulation der ABE Fermentationskinetik in kommerziellen Prozesssimulatoren“
Chemie

MICHAEL BOTTESCH, Thema: „On magnetic compass orientation in coral reef fish larvae and on the sensitivity to polarized light in birds“ Biologie

JENS BRAUER, Thema: „Scanning Near-Field Optical Spectroscopy with an Inline Interferometer or Probing Local Absorption“
Physik

ANNE MAREIKE BRUNS, Thema: „Alternative Investments: An Empirical Study of Their Risk-Minimizing Effect on European Banks Portfolios with Equities and Bonds“
Mathematik

WENJIAN CHEN, Thema: „Backcontact Modification of CZTSe Based Solar Cells“ Physik

MEGAN DE JAGER, Thema: „The potential of hydrochar for soil improvement and carbon sequestration“ Umweltwissenschaften

ONNO RENKE DIERMANN, Thema: „Zur Bedeutung von Resonanzen in periodisch angetriebenen offenen Quantensystemen“
Physik

ANNA DIERKS, Thema: „Synthese neuer N-heterocyclischer Scaffolds aus β-und δ-Oxoestern“ Meereswissenschaften

LEON DLUGOSCH, Thema: „Functional biogeography of pelagic and sediment-associated marine microbial communities“
Meereswissenschaften

SILKE EILERS, Thema: „Analysis and assessment of cumulative effects of anthropogenic pressures on ecosystem components“
Marine Umweltwissenschaften

MADITA EINEMANN, Thema: „Aktivierung von Ammoniak unter Fischer-Tropsch Bedingungen“ Chemie

STEPHANIE ELFERINK, Thema: „Molecular diversity of microeukaryotes: linking biodiversity and functional diversity within the water column“ Meereswissenschaften

KAI FLATHMANN, Thema: „Analytical Methods in Generalized Theories of Gravity“
Physik

NILS FRERICHS, Thema: „Bindungsaktivierungsreaktionen an Amiden der Gruppe 4 Metalle – Untersuchungen zu elektrophilen Trisamidkationen“ Chemie

CLAUDIA GOTT, Thema: „Klimawandel im Kontext des Klimasystems vermitteln: Cognitive-Development-Prozesse im Zuge der Verknüpfung schulischen und außerschulischen Lernens“ Physik

ANJA GÜNTHER, Thema: „Double cones in the avian retina: Location of cryptochrome 4 and photoreceptor connectivity“
Biologie/Umweltwissenschaften

ENRICO GUIRAUD, Thema: „Scalable unsupervised learning for deep discrete generative models – novel variational algorithms and their software realizations“ Physik

JULIUS HEUCHERT, Thema: „Charakterisierung neuer herbizider Wirkstoffziele – Phylloquinon-Synthese und Spleißen“ Biologie

SIMONE HEYEN, Thema: „Development and Application of a Method for the Identification and Quantification of Organic Acids in Microbial Exometabolomes“
Meereswissenschaften

RENÉ JAKOB, Thema: „Konstruktion und Aufbau eines Rastertunnel-Fasermikroskops für die Untersuchung von Oberflächen auf der Nanometer-Skala“ Physik

ELHAM KAMYAB, Thema: „From Chemical Ecology towards Biotechnological Applications: A Study on Sea Cucumbers Derived Secondary Metabolites“ Biologie

NILS KRÜGER, Thema: „Berechnung von stationären und zeitperiodischen quantenmechanischen Vielteilchenzuständen mithilfe von intelligenten Algorithmen“
Physik

STEFAN LANDMANN, Thema: „A Statistical Physics Perspective on Complex Ecosystems and Adaption to Fluctuating Environments“
Physik

GUÉNOLÉ LE PENNEC, Thema: „Evolution of genetic architectures through hybridization between species“
Biologie/Umweltwissenschaften

JULIAN LORENZ, Thema: „New Electrochemical Approaches for the Investigation of the Oxygen Evolution and Reduction Reaction of Mesostructured Cobalt-based Transition Metal Oxides“ Chemie

BJÖRN MAACK, Thema: „Untersuchung des zeitabhängigen Oxidationsverhaltens polykristalliner Kupferschichten als Funktion von Druck, Temperatur, Granularität und chemischer Zusammensetzung des Ausgangsmaterials“ Physik

ANCHILIE MANGILET, Thema: „Dissecting the role of the U1 snRNP complex in coordinating transcription, RNA processing, and stress responses in Arabidopsis thaliana“
Biologie/Umweltwissenschaften

ANASTASIA MERK, Thema: „SET-Prozesse in Lewis-Säure-Base-Paaren und Reaktivitätsstudien zu halogenstabilisierten Silylkationen” Chemie

JENS MEYERJÜRGENS, Thema: „Observations of Processes governing the Dynamics of Marine Litter in the North Sea“
Marine Umweltwissenschaften

LARS MOHRHUSEN, Thema: „Point Defects at Rutile TiO2: From Minority to Game-Changers in Bifunctional Oxide (Photo-)Catalysis“ Chemie

GHAZALEH MOLLA AHMADI DEHAGHI, Thema: „Characterization of Realizable Stochastic Based Dynamic LES in High Reynolds Turbulent Flows“ Physik

JELTE NIMOTH, Thema: „Si-H-Si Stabilised Oligosilanylsilyl Cations and Dications with Multiple Si-H Functionalities – Syntheses and Analyses by NMR Spectroscopy and Quantum Mechanical Methods“ Chemie

RONJA PAFFRATH, Thema: „Terrestrial Input of Rare Earth Elements and Neodymium Isotopes to the Ocean and their Transport and Cycling – Case Studies from the Arctic Ocean and the Southern North Sea“
Meereswissenschaften

NORA-CHARLOTTE PAULI, Thema: „The role of Antarctic krill and salps in the carbon cycle at the Antarctic Peninsula“
Marine Umweltwissenschaften

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Imprint

Issue 66, 36st year of publication
ISSN 0930/8253
uol.de/en/einblicke
Press and Public Relations Office
Ammerländer Heerstraße 136
26129 Oldenburg
Phone: +49/441/798-5446, Fax: -5545
presse@uol.de

Publisher:
Presidential Chair of the Carl von Ossietzky University of Oldenburg

Chief Editors:
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Freelance work:
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Layout, Design, Grafic and Titel:
Inka Schwarze

Translations:
Lucy Powell, Alison Waldie

Printed by:
Officina-Druck - Posthalterweg 1b
26129 Oldenburg - Tel.: +49/441/36144220
info@officina.de

Photos:
AdobeStock/AGD Beukhof: p. 5 (r.)
AdobeStock/BoukeAtema: p. 26/27
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Paper: PEFC certified
(Programme for the Endorsement of Forest Certification Schemes)