LICHTGEDANKEN

The Research Magazine

10

BACKGROUND THE PIONEERS OF EARLY ROMANTICISM IN JENA

PUBLICATION ROMANTICISM – THE MISUNDERSTOOD ERA

SURVEY WHY DO WE NEED SCIENCE COMMUNICATION?

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The human superpower

Now, hand on heart, what do you think of when you hear the term »romantic«? Sunsets, idyllic landscapes, candlelit dinners? You are probably not alone in this, and yet you are far from the essence of the Romantic era. Because this period does not reveal itself only in its lyrical, mystifying or melancholic view of the world. On the contrary, the literature and art of Romanticism have made us aware of our imagination, opened up space for thought and reflection, and in this way enabled completely new forms of artistic expression.

This year is the 250th anniversary of the birth of German romantic poet and philosopher Novalis, who studied in Jena, among other places. To mark this event, the current issue of LICHT**GEDANKEN** is turning its attention to this era. Romanticism shaped modernity and in Germany, it all began at the University of Jena (p. 10), where researchers are currently engaged in a wide variety of projects on this topic (p. 18 ff.). In interviews and articles, we examine Romanticism in literature (p. 14 ff.) and the visual arts (p. 22 ff.), and trace its continued effects on today's politics (p. 30) and society (p. 32).

Like the people from the early Romantic period, we too are currently facing huge challenges. Whereas at the beginning of the 19th century, these were the radical changes resulting from the French Revolution, which affected the whole of Europe, today it is the climate crisis or the ongoing coronavirus pandemic that demand new political and social courses of action and structures. During this process, we have to endure uncertainties and recognize that empirical knowledge takes time to grow, while at first it often appears contradictory. Nevertheless, we have to make decisions—even if we do not yet know every detail of the possible consequences. In this issue of LICHT**GEDANKEN**, you can read a commentary on the fact that such »non-knowledge« is not necessarily a flaw, but can even be an advantage in many areas of life (p. 61). Researchers at our university also provide information on how they share both knowledge and non-knowledge with the general public, and explain why we need science communication—also and especially in view of doubts and scepticism regarding science (p. 40 ff.).

Doubts and uncertainties are self-evidently part of science. The pandemic shows that this also applies to social interaction: we are those affected and those who observe, researchers and research subjects at the same time. To be aware of this ambivalence and to keep changing perspectives, to consider both the individual and the whole, and to do this not always only seriously, but also playfully or with a touch of irony—all this is what Romanticism teaches us. Let us make use of its legacy! In dealing with the challenges of our time, let us trust scientifically proven methods and empirical data as well as our imagination—the unique human superpower!

I wish you a stimulating read and welcome any feedback, suggestions or criticism. You can contact me and the editorial team at: presse@uni-jena.de.

Jena, January 2022

PHOTO: JENS MEYER

FEATURE

The imagined reality

PHOTO: CHRISTOPH SANDIG

PHOTO: JENS MEYER

PHOTO: JÜRGEN SCHEERE

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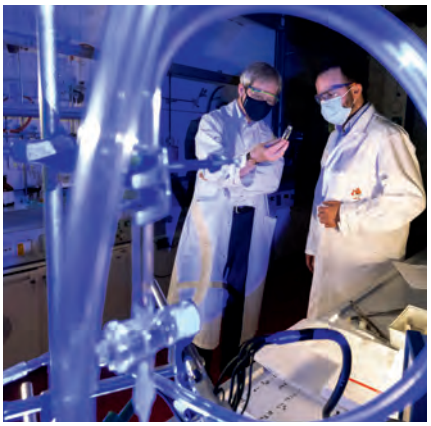

PHOTO: JENS MEYER

PHOTO: JENS MEYER

New science campus

The State of Thuringia and the University of Jena have agreed to build new premises for biomedical research and teaching on the former hospital grounds on Bachstraße.

PHOTO: JENS MEYER

The plot of land on Bachstraße will continue to be used for university purposes in the future. This was recently announced by Thuringia's Minister of Science, Wolfgang Tiefensee (pictured left), the Lord Mayor of Jena, Dr Thomas Nitzsche (right) and University President, Prof. Dr Walter Rosenthal.
An inner-city science campus is planned, with a special focus on biomedical departments such as Pharmacy, Nutritional Sciences, Pharmacology and Physiology. The aim is to establish a closer link between urban and academic life.
Bachstraße is located in the immediate vicinity of Jena city centre. The street is lined with large buildings from different eras that shape the cityscape. The plot is 39,000 square metres in size. Most of the land is owned by the State of Thuringia, while other areas belong to the University Hospital and a small amount is the property of the Ernst Abbe Foundation. The state is planning to finance the construction work through the European Regional Development Fund (ERDF). PM

»Jena Declaration« signed

International network has urged for a change in strategy to achieve UN Sustainable Development Goals.

When the United Nations adopted the 2030 Agenda six years ago, the member states committed themselves to creating a more sustainable world. They set themselves a total of 17 individual goals such as »no poverty«, »quality education«, »good health and well-being« and »responsible consumption and production«. However, they seem to be a long way off achieving their goals.

PHOTO: JAN-PETER KASPER

That's why a network of renowned institutions is now calling for a clear change of strategy. On the initiative of Prof. Dr Benno Werlen (pictured left) from the UNESCO Chair on Global Understanding for Sustainability at the University of Jena, over 30 institutions have signed the »Jena Declaration«, in which they define a new cultural approach to achieving the Sustainable Development Goals. PM

»JenaVersum« founded

More than 20 partners from science, business and the local community have come together.

When »JenaVersum e. V.« was founded on 18 November 2021, this marked the start of a new chapter in Jena's cooperation history. The new network aims to promote research collaboration on site, to raise Jena's profile as a science and business location around the world, and to strengthen interactions with society. In addition to the University of Jena, the »JenaVersum« brings together the University of Applied Sciences Jena, the University Hospital, non-university research institutions and foundations, partners from the city and research-related companies.

PHOTO: JENS MEYER

Founding charter with the signatures of all actors in the new network »JenaVersum«.

»As a university with traditionally close ties to the city and all local partners in the field of research, we're very much interested in maintaining this network and expanding our fruitful cooperation,« says Prof. Dr Walter Rosenthal, who is both the President of the University of Jena and Chairman of the »JenaVersum« association. PM

Humboldt Professorship

Germany's highest funded research award goes to the new Professor of Viral Ecology, Prof. Dr Bas E. Dutilh.

Prof. Dr Bas E. Dutilh (pictured below) is one of ten researchers throughout Germany to be awarded an Alexander von Humboldt Professorship. The award includes up to five million euros in prize money and is financed by the Federal Ministry of Education and Research (BMBF).
Dutilh specializes in modelling microbial balance and is investigating the role played by viruses within this system. His new Professorship of Viral Ecology at the University of Jena is part of the »Balance of the Microverse« cluster of excellence.

PHOTO: PRIVATE

Pioneer of virus discovery

Over the past ten years, Dutilh has established himself as a pioneer in the field of virus discovery with the help of metagenomics. Since 2018, he has been one of the most cited experts in this field around the world, as confirmed by his current ranking within the »Highly Cited Researchers«. Dutilh has recently been given an ERC Consolidator Grant, facilitating his move from Utrecht University in the Netherlands to Jena. He is looking forward to expanding the scope of his computer-aided research in a new research environment and developing high-throughput experiments in a brand-new laboratory. As part of the Alexander von Humboldt Professorship, he will focus on combining his work in the field of virus discovery with his line of research on microbiome modelling. NB

PHOTO: JENS MEYER

HRK vice-president

Prof. Dr Walter Rosenthal in charge of research

The German Rectors' Conference (HRK) elected its vice-presidents in November 2021. As one of ten members of the Executive Board, Prof. Dr Walter Rosenthal (President of the University of Jena; pictured above) is now responsible for research, academic career paths and transfer.
Rosenthal wants to further improve the conditions for researchers in Germany, from basic research to production, in order to offer German universities the best possible support on the international stage. KBB

Research Training Group on artificial intelligence

The Carl Zeiss Foundation is funding computer scientists with a total of 4.9 million euros over the next six years as part of an initiative called »Scientific Breakthroughs in Artificial Intelligence«.

The new »Interactive Inference« Research Training Group will be launched in April 2022 to examine probabilistic models and draw conclusions from them using data. The aim is to improve the reliability of artificial intelligence, which is now used in many areas of society such as medicine, business and science. The focus will be on the development of algorithms that have verifiable guarantees and make effective use of the properties of modern computer hardware. »Our aim is to develop algorithms that make it possible to draw conclusions from large volumes of data and for complex models,« explains Prof. Dr Joachim Giesen, one of the spokespersons for the Research Training Group. »We're combining exact algorithms that can ensure the best decision based on the state of the data and the possibilities of a model, as well as approximating algorithms that scale better to large volumes of data and complex models.«
This topic will be addressed from different perspectives by two groups, each with seven doctoral candidates. The team members come from the fields of machine learning, artificial intelligence, advanced computing, logic, visualization, bioinformatics and theoretical biology. sh

View of the city centre of Jena—in the middle the »Jentower«. Right where the 159-metre-high tower stands today was the »nucleus« of early Romanticism in Jena at the end of the 18th century: the home of August Wilhelm and Caroline Schlegel, where Friedrich Schlegel and Caroline Veit also temporarily resided. The photo was taken from the »Jenzig« hill. · Photo: Jens Meyer

FEATURE

The imagined reality

On the legacy of Romanticism in the modern world

Does life have a meaning? And if so, what is it? Are we as individuals part of a greater whole? Some questions cannot be answered unequivocally, even with the most sophisticated scientific methods. But that does not stop us from searching for answers nevertheless. In doing so, we allow ourselves to be guided by our imagination: we create utopias, envision the future and imagine worlds and dimensions that go beyond those that can be measured and experienced. This form of conscious creation of meaning is an invention of Romanticism—the second innovative movement after the Enlightenment to set modernity on its way. Researchers at the University of Jena are studying the present-day traces of this era, in the very place where Romanticism had its origins in Germany.

The dawn of the modern age

Modernity has its roots in the Enlightenment and Romanticism. Germany's romanticist roots are in Jena, where the leading academics would meet at the end of the 18th century to set new artistic standards and cultivate a lively intellectual conviviality. There is so much more to Romanticism than the glorification of nature and emotional infatuation—and that still rings true today.

BY UTE SCHÖNFELDER

What does romantic even mean?

The term »romantic« was originally used to describe the characteristics of romance in a narrative, so it refers to a concept which is »like something out of a novel«. A similar term is used to describe a family of languages that evolved from Latin, such as French, Spanish and Italian. From the late Middle Ages to the 17th century, most novels (mostly tales of chivalry) were written in these »Romance languages«. Romantic poets were inspired by medieval topics and stories, often telling them in the form of fairy tales and myths.

The dawn of a new era

Romanticism followed the Age of Enlightenment immediately after the French Revolution. In Germany, this new era began in Jena around the year 1796. From 1805 onwards, the »High Romanticism« movement spread mainly from Heidelberg and Berlin. Berlin, Vienna and Munich became the centres of Late Romanticism from 1818. These were troubled times from a socio-political perspective—after all, France wasn't the only country that underwent a change from feudalism to bourgeois society, bringing about new freedoms and civil rights. The Romanticists perceived this spirit of change in their work and developed their own air of academic self-confidence. In its early days in Jena, Romanticism was a progressive, avant-garde movement that brought about completely new forms of expression. The fact that Jena was the starting point for the Romantic movement in Germany is thanks to its university, where Friedrich Schiller and Johann Gottlieb Fichte taught at the time. Johann Wolfgang Goethe was the minister responsible for the university and often stayed in the city. Schiller advised the 28-year-old philologist and literary critic August Wilhelm Schlegel to move to Jena in 1796. He was followed by his younger brother, Friedrich, who was a philosopher, art critic and literary critic. August Wilhelm was appointed to the university as an associate professor in 1798, in the same year as Friedrich Wilhelm Joseph Schelling. Thanks to its university, Jena became the centre of intellectual and cultural life in Germany—if it hadn't been for this institution, the Romantic philosophers and writers certainly wouldn't have been attracted to the city.

Shared house and workshop

The true centre of Early Romanticism in Jena was a house on the former street called Leutragasse, where August Wilhelm and Caroline Schlegel lived from 1796. Friedrich Schlegel also moved in later that year—before relocating to Berlin in 1797. In 1799, he returned to the shared accommodation in Jena with his lover Dorothea Veit. The famous »Romanticist Gathering« then took place in November 1799, attended by the four residents of the house along with Friedrich von Hardenberg (Novalis), Friedrich Wilhelm Joseph Schelling and Ludwig Tieck. They spent five days engaged in work and discussions as they read to one another, ate and drank together, combining an air of conviviality with a workshop-like atmosphere.

If you want to look for the original location where the Romanticists lodged together, you will need a lot of imagination… After all, the house was located on the site of today's Eichplatz—in the middle of a car park. The house was destroyed at the end of the war in 1945—and the Leutragasse was demolished a few years later along with the entire historical city centre. However, the birthplace of Romanticism in Jena can still be seen from the »Jentower«.

Jena's Romanticists would probably see this architectural specimen as an homage to their grandeur. Their thematic ideas were revolutionary: Friedrich Schlegel completely redefined literature with his »progressive universal poetry«. He described it as a proverbially »limitless«, cross-genre form of art that is constantly evolving, fed solely by the author's imagination and creativity and without the restrictive corset of the poetry rules that had been widespread up to that point. Schlegel wanted to combine literature, philosophy and criticism.

Early Romanticists were distinguished by their fragments that were mostly published in the journal »Athenaeum«, which acted as the mouthpiece of Early Romanticism in Jena from 1798 to 1800. The few sentences in these short texts reflected the authors' thoughts on phi-

The original »Romantikerhaus« in the former Leutragasse. The rear building shown here was home to August Wilhelm Schlegel, Friedrich Schlegel, Caroline Schlegel and Dorothea Veit from 1799 to 1800. The building was then known as »Döderleinsches Haus«. It was destroyed in 1945. · Copyright: Städtische Museen Jena

losophy, art and social issues. They were mostly written in an ironic, controversial and provocative manner—and quite deliberately in an »unfinished« form. Friedrich Schleiermacher, a leading theologian of the Romantic era, once described the fragments as »critical shavings« that were intended to ignite independent thought. Many fragments are playful and reveal the fun the authors must have had when writing them.

Emancipation and conviviality

The early Romanticists in Jena also demonstrated their passion for experimentation and their joie de vivre in their lifestyle. The non-conformist shared house in Jena was a place of liberal conviviality, where people would meet to take part in theatrical performances, attend readings and discuss topics, inspired by the salons of Paris. The early Romanticists would wear the latest French fashion, catching the eye of many a passer-by in what used to be a small university town with around 4,500 inhabitants. Friedrich Schlegel and Dorothea Veit must have caused quite a stir with their »wild marriage«—and August Wilhelm and Caroline Schlegel were arguably in an open relationship by today's standards. The role of women in Romantic circles was truly remarkable—not only in terms of their social position. They were also intellectually emancipated, albeit within their own environment (women would have to wait another hundred years until they were allowed to study or even teach at university). Caroline Schlegel worked with her husband August Wilhelm Schlegel on translations of the works of Shakespeare. Dorothea Veit wrote her own novel (»Florentin«), which was published anonymously by her partner Friedrich Schlegel in 1801. The male Romanticists saw their wives as their equals—even if they caused a lot of social controversy. The early-Romantic ideal of a partnership was described by Friedrich Schlegel in his novel »Lucinde« as a sensual, emotional and intellectual interaction between the characters Julius and Lucinde, creating a sharp contrast to the »marriage of convenience« that had been portrayed in previous eras. ■

Romantic places in modern-day Jena

Romantikerhaus

The literature museum that is now known as the »Romantikerhaus« is located in the former home of the philosopher Johann Gottlieb Fichte, who lived there from 1795 to 1799 (Unterm Markt 12). Fichte was appointed to the University of Jena as a professor in 1794 and became one of the pioneers of Romanticism. His lectures were held in his house. Today's museum highlights the cultural and intellectual events that led to the emergence of Early Romanticism in Jena and presents its protagonists. The museum is currently closed for renovation work, but you can always explore the rooms as part of a virtual tour.

Schiller's Garden House

The house with a garden that used to be located just outside the city was bought by Friedrich Schiller in 1797 and he spent the summer months there with his family until 1799 (Schillergäßchen 2). The poet and university professor created numerous works there, including the »Wallenstein« trilogy. He also welcomed numerous high-profile guests such as Johann Wolfgang Goethe, Friedrich Schelling and Johann Gottlieb Fichte. The buildings now belong to the University of Jena, which uses them as a museum and event venue. The »Research Centre for European Romanticism« has also been based there since 2010 (see p. 34).

Frommann's estate

The building complex located at Fürstengraben 18 is the former home and publishing house of bookseller Karl Friedrich Ernst Frommann. This is another location that attracted a great number of prominent personalities around 1800 with household names such as Goethe, Schiller, the Schlegels, Fichte, Schelling and Hegel. It now belongs to the University of Jena and houses the Institute of German Literature as well as the Institute of Studies in Arts and Culture, which are the key institutions for Romanticism research.

The pioneers of Early Romanticism in Jena

PHOTO: ANNE GÜNTHER

August Wilhelm Schlegel

(1767–1845)

After spending his formative years in Hannover, Schlegel began his studies in Göttingen in 1786, where he first studied theology before switching his focus to classical philology. After completing his studies in 1791, he moved to Amsterdam to work as a private tutor and pursued literary studies. His essay on »Dante's Inferno« garnered high praise from Schiller, who suggested that he come to Jena, which Schlegel did in 1796 shortly after his marriage to Caroline Böhmer. When in Jena, he worked on translations of the works of Shakespeare, publishing no fewer than 17 translated dramas between 1797 and 1810. From 1798 to 1800, he and his brother Friedrich published the journal called »Athenaeum«, the mouthpiece of Early Romanticism. In 1798, he was appointed as an adjunct professor at the University of Jena, where he gave a series of lectures on topics such as »Philosophical Art Theory«. In 1801, he settled in Berlin as a private scholar. In 1803 his marriage to Caroline was divorced.

Caroline Schelling

(1763–1809) NÉE MICHAELIS, WID. BÖHMER, DIV. SCHLEGEL

As the daughter of a scholar from the University of Göttingen, Caroline was introduced to literature at an early age. In 1784, she was married to the doctor Franz Böhmer and moved with him to Clausthal in the Harz region. Her daughter Auguste was born in 1785. By 1788, she had given birth to another daughter and a son, both of whom died as infants. Her husband also died in 1788. After moving to Mainz in 1792, Caroline witnessed the birth of the »Republic of Mainz«. She supported their revolutionary democratic ideas. In 1793, she became pregnant with the baby of a French lieutenant. As the Prussian forces moved in on Mainz, Caroline attempted to flee the city but was captured and imprisoned for several months due to her alleged ties to the Jacobins. After being released from prison, she gave birth to her fourth child, a son. He also died before the age of two. She married August Wilhelm Schlegel in 1796 and moved with him to Jena, where she helped her husband to translate the works of Shakespeare as a central figure within the home shared by the Romantic pioneers at Leutragasse 5. In 1803 her marriage was divorced and Caroline married Friedrich Joseph Wilhelm Schelling.

PHOTO: ANNE GÜNTHER

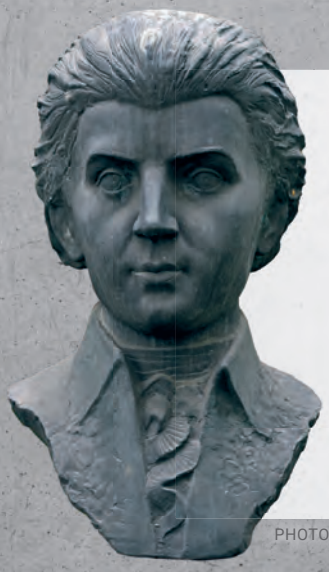

PHOTO: ANNE GÜNTHER

Friedrich Schlegel

(1772–1829)

Just like his older brother August Wilhelm, Friedrich Schlegel grew up in Hannover and started studying in 1791, first in Göttingen and then in Leipzig. His studies included law, philosophy, classical philology and history. In 1794, he moved to Dresden to work as a freelance writer. He joined his brother in Jena in 1796. In 1797, he met the theologian Friedrich Schleiermacher and the author Ludwig Tieck, as well as his future wife Dorothea Veit. With Novalis, whom he had known since his student days in Leipzig, he developed a Romantic art form known as »fragments« in the journal »Athenaeum«. He rose to prominence with his 116th Athenaeum fragment, in which Schlegel described the Romantic poetic agenda as »progressive universal poetry«. Schlegel habilitated at the University of Jena in 1800 and continued teaching there as a private lecturer. In 1801, he left Jena and moved back to Dresden with Ludwig Tieck.

Friedrich Wilhelm Joseph Schelling

(1775–1854)

Born into a family of Swabian pastors, Schelling was granted special permission to join the Protestant Foundation within the University of Tübingen in 1790 and studied theology, philosophy and philology. At certain points during his studies, he shared a room with Friedrich Hölderlin and Georg Friedrich Wilhelm Hegel. In 1796, Schelling moved to the University of Leipzig, where he studied mathematics, science and medicine. In 1797, he presented his »ideas on the philosophy of nature«. Goethe was so impressed that he paved the way for Schelling to take on a professorship at the University of Jena, which happened in 1798. In Jena, he met the group of early Romanticists led by the Schlegel brothers and regularly visited their house at Leutragasse 5. This is where he met Caroline Schlegel, whom he married in 1803 following her divorce from August Wilhelm Schlegel. In the same year, Schelling accepted a position at the University of Würzburg.

PHOTO: JAN-PETER KASPER

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Ludwig Tieck

(1773–1853)

The son of a Berlin rope-maker developed a keen interest in theatre at an early age and wrote his first dramas when he was only 15 years old. Tieck studied history, philology and literature in Halle, Göttingen and Erlangen. In 1794, he returned to Berlin and started working for the publisher and enlightener Friedrich Nicolai. In 1797, he published his »Folk Tales, edited by Peter Leberecht«, in which he depicted old stories and fairy tales and revealed his turn to Romanticism. In 1797, Tieck met Friedrich Schlegel, who led him to the group of early Romanticists in Jena. In autumn 1799, he moved to Jena with his family and took part in the legendary »Romanticism meeting« at the Schlegels' house. His second collection of narrative and dramatic works was published in Jena under the title »Romantic Poems«. In 1801, Tieck left Jena and moved to Dresden with Friedrich Schlegel.

Friedrich von Hardenberg

(1772–1801)

Georg Philipp Friedrich von Hardenberg was descended from an ancient family of aristocrats. Born on the family estate in Oberwiederstedt in Mansfeld Land and raised in the municipality of Schlöben in Thuringia, Hardenberg moved to Jena in 1790, and then to Leipzig and Wittenberg to study law. He met Friedrich Schiller and Friedrich Schlegel during his time there. In 1795, he entered the Saxon civil service and got engaged to Sophie von Kühn, who was only 13 years old at the time. Her death in 1797 hit him hard. In 1797, Hardenberg began his studies at the University of Mining and Technology in Freiberg, where his disciplines included geognosy and metallurgy, chemistry and mathematics. His »Blütenstaub« fragments were published in the journal »Athenaeum« in 1798, which was the first time he used the pseudonym »Novalis«. In 1799, he was appointed as a saltworks assessor in Weißenfels and wrote his fragmentary novel »Heinrich von Ofterdingen«, which gave rise to the romantic motif of the »blue flower«. However, his work remained unfinished. Novalis died in 1801 at the age of 28.

COPYRIGHT: NOVALIS-MUSEUM OBERWIEDERSTEDT FOTO: CHRISTOPH SANDIG

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Dorothea Schlegel

(1763–1839) NÉE MENDELSSOHN, DIV. VEIT

The daughter of the Jewish enlightener and philosopher Moses Mendelssohn grew up in the intellectual centre of Berlin. Her parents' home was frequented by the likes of Friedrich Nicolai, Gotthold Ephraim Lessing and Friedrich Gottlieb Klopstock. Dorothea married the banker Simon Veit in 1783 and gave birth to four sons, two of whom two survived. Her salon, which she ran with her friend (the writer Henriette Herz), was visited by the likes of Alexander and Wilhelm von Humboldt, Ludwig Tieck and Friedrich Schleiermacher. That's where Dorothea met Friedrich Schlegel in 1797 and the two became lovers—despite the fact he was nine years her junior. One year later, she left her husband and moved with Schlegel to Jena. She divorced in 1799. She converted to Protestantism in 1804 before turning to the Catholic faith with Friedrich Schlegel in 1808 and marrying him.

What we cannot know, we imagine.

Literary scholar Prof. Stefan Matuschek heads the Research Training Group »The Romantic Model. Variation–Scope–Relevance« (see p. 18). In the interview, he explains how Romanticism can save us from fundamentalism today, why Goethe and Schiller are not »classical authors« but »Romantics« and why Romanticism in Germany would have undergone a completely different development without the University of Jena.

INTERVIEW: UTE SCHÖNFELDER

What is the essence of Romanticism for you?
This is made clear above all in the relationship of Romanticism to the Enlightenment. A still popular idea is that Romanticism is a kind of counter-movement after the scientific, conceptual Enlightenment, a kind of re-enchantment of the world. In a negative sense, it is then often seen as involving irrationalism or even, as Georg Lukács once said, the destruction of reason. I think that is quite wrong. Romanticism is a very valuable legacy for us! It offers us a modus for dealing with things that we cannot process at the level of our clear concepts and clear reason: is there a perspective beyond individual, physical death? Does life have a meaning? We cannot find empirical answers to such questions, but they have very great significance for human life. That is why we seek answers. And we find answers through our imagination.

That is to say, we just make up the answers ourselves?
That is to say that we imagine things. We can imagine a life after death. We can imagine the world and our lives as a whole. However, that alone does not constitute the legacy of Romanticism. The legacy of Romanticism is its ability to show us the difference between what we can measure and what we can only imagine.
Romanticism in literature developed procedures that indicate this boundary between what I can know precisely and what goes beyond that by means of the imagination. In its literature, it celebrates human life and the human perception of the world as one that always has an imaginary surplus. And the great thing about Romantic literature is that it was the first to mark such a thing stylistically, with elements of irony, of subjectivation.
I like to explain this with the metaphor of two-in-one optical illusion pictures, in which you see first one figure and then the other. Romanticism develops such two-in-one figures out of literary stylistics, with conceptions of wholeness and transcendence, and the hint that they are only imaginary concepts. One takes this seriously while knowing, nevertheless, that it is only an imaginary concept. Romantic literature is the first to have achieved something like this stylistically.

Do you have an example of this?
A very vivid example is the poem »Moonlit Night« by Joseph von Eichendorff. The third verse reads: »Meine Seele spannte weit ihre Flügel aus, flog durch die stillen Lande als flöge sie nach Haus« (»And my whole soul outspreading her wings abroad to roam, flew thro' the sleeping land, as if flying home«). It's all in the subjunctive »flöge« in the last line! Everything is imagination. The author conveys a pleasurable experience of nature and a comfort beyond earthly life. He puts it in this simple yet easily imagined metaphor. I can literally see the soul before me as a little bird. The fact that it flies »home« is also an imaginary concept. It can be a Christian confession, but it doesn't have to be. And that's wonderful! The poem conveys this concept and at the same time the awareness that it is only an imaginary concept.

What do you think is valuable about it beyond the study of literature?
This literature is an expression of modern transcendence. This innovation of Romanticism is a consequence of the Enlightenment. The Romantics think and formulate on the basis of the Enlightenment. They were all enlightened people. But they knew about the impact of imagination on human life. After the innovations of the Enlightenment, we have in Romanticism the second impetus to innovation that helped to set modernity on its course just as much as the Enlightenment itself. The question of how to deal with something about which we have no certain knowledge is still highly relevant today. Because we don't simply remain silent about these questions, but form imaginary concepts. And we can make ourselves aware that they are only imaginary concepts. If we understand Romanticism in this way, it is the most effective means against any form of fundamentalism.

Myths played an important role in the Romantic era. Do you see parallels in the present, as, after all, myths spread faster than ever today, for example in social media?
Yes, there are definitely parallels. Above all, we can see what happens if we don't accept the legacy of Romanticism! The essential thing about the Romantic new mythology was the awareness that a new mythology was being created—not a new science. The Romantics wanted to create new narratives that were at the cutting edge of contemporary knowledge and yet could be understood by all. The problem we have with modern internet myths is that many people do not reflect on them as myths. I think it is important in this context not to use the term conspiracy theory, but to speak of conspiracy myths instead. We have to realize that these are myths, not »theories« that provide possible explanations

of reality. If we succeed in doing this, we will have understood the legacy of Romanticism. Because then we will be aware of the imaginary as such. Then we will be reflective Romantics.

Goethe and Schiller, the representatives of »Weimar Classicism«, are considered Romantics in other European countries. Why is that?

That is a great misunderstanding. There is no such thing as an era of »Classicism«. »Classicism« is not an era, but instead the term »classic« describes in literature that which is considered exemplary. In European literature, each example of a classic belongs to a completely different era. Italian classics are from the late Middle Ages and early Renaissance. English classics are a »one-man show« called Shakespeare and date back to the Elizabethan Baroque. French classics are also Baroque, associated with the court theatre of Louis XIV in the late 17th century. And German classics just happen to appear in the transitional period between the Enlightenment and Romanticism. And when we speak of the »classics«, we mean the writers who took part in these two eras that have shaped modernity.

So that means Goethe and Schiller, among others?

Exactly. Goethe and Schiller are Enlightenment writers and Goethe and Schiller are also Romantics. And that is not a contradiction! On the one hand, they do not leave behind their Enlightenment origins, but remain Enlightenment thinkers to the end. At the same time, they are very innovatively involved in the developments of Romanticism. The first part of Goethe's »Faust« is the masterpiece of European Romanticism!

Stefan Matuschek in front of the »Romantikerhaus« (see p. 11), the literature museum of the city of Jena in the former home of the philosopher Johann Gottlieb Fichte. In front of the building are busts of August Wilhelm and Friedrich Schlegel (l.) and Caroline Schlegel (r.), the central protagonists of Jena's early Romanticism. · Photo: Jens Meyer

Goethe and Schiller also had a close relationship with Jena. Why did Jena become the centre of the early Romantic movement in Germany?

The University is a very substantial part of the history of the founding of Romanticism. If Jena hadn't had a university, it wouldn't have happened here. And it wouldn't have happened either if the University of Jena hadn't been so poor around 1800.

Why not?

The university appointed young people who were not yet established in their careers, because they were simply cheaper. And the good fortune was that these people achieved so much and that they were so productive, especially in their early years. The key person for the beginning of Romanticism is August Wilhelm Schlegel. He came to the University of Jena in 1796, and was followed by other important figures, such as his brother Friedrich and Friedrich Schelling in 1798. The fact that Jena was a small town at the time and that academic culture could therefore be so dominant also played a role. The early Romantics believed they were at the summit of society. That would not have been possible in a big city. Basically,

then, one has to postulate that it was not Jena as a city that was the birthplace of Romanticism, but the University of Jena. It's something special for a university to write cultural history in such a way!

Is the Romantic movement, especially Jena's early Romanticism, a generational movement?

Yes. Conflicts increasingly arose between the established generation of writers of the Enlightenment and the young generation of the emerging early Romantic movement. But the conflicts were not so much about content. What separated the young people from the established Enlightenment writers was their attitude to what is termed »common sense«. And that resulted from the influence of Kantian philosophy as represented by the Romantics.

In what way?

At the time, Kant's philosophy had a greater impact in Jena than in any other place. Kant may have given his lectures in Königsberg, but he caused far more of a stir with them in Jena than he did there. And Kant's philosophy suggests that common sense alone is not enough, but that there is a breach in the attitude to reality, between scientific knowledge and human self-reflection. Kant made a distinction, for example, between the concepts of »understanding« and »reason«: understanding uses secure knowledge obtained from empirical facts and reason uses the ideas that go beyond that. This distinction did away with the idea that one could use common sense to answer everything coherently. The young Romantics took this on board and considered the established Enlightenment thinkers to be out of step with the times. Therefore, the early Romantics are not breaking with the Enlightenment, but with the confidence in common sense.

In your opinion, what is the importance of research on Romanticism today and what questions are still open?

Romantics in the Thuringian State and University Library (ThULB): Johann Wolfgang Goethe (left) in a painting by Heinrich Christoph Kolbe (1771—1836) from 1822 and Stefan Matuschek reading. · Photo: Jens Meyer

It's still very important. For some decades now, it has formed a very broad track in literary studies. What is new is that Romanticism is currently being placed in European contexts. National literatures are not appropriate boundaries. This also leads to a current open question in Romanticism research: is there a unity of Romanticism or is it made up of areas that differ too much? We are looking into this question in our Research Training Group (see p. 18). In this research, we are using the concept of the model. Therefore—to anticipate things somewhat—there is not one Romanticism and neither is there an infinite number of Romanticisms, but instead, certain models have emerged. That is what we're working on in the various interdisciplinary projects.

What fascinates you personally about this era?
I'm fascinated to see what an impact literary forms can have on life. That such research is not just a niche philological occupation, but that Romanticism can provide a better understanding of human reality.

Do you have a favourite Romantic?
No. I've studied too many of them for too long and too intensively for that.

And how about a reading tip for laypeople to help them gain an understanding of Romanticism?
I would recommend E.T.A Hoffmann's »The Sandman« or »The Golden Pot«. Hoffmann wrote in a very innovative and masterly fashion. He used the fantastic—incidentally also an invention of Romanticism—to depict problems of the human psyche and get to the heart of those problems like no one else had done before him. He can be considered the most important author in Germany around 1800! And he combines high-quality literature with entertainment. That would be a good introduction to Romanticism. ■

The misunderstood era

In his current book, »Der gedichtete Himmel« (»Poetic heaven«), literary scholar Stefan Matuschek dispels misconceptions and clichés about Romanticism. His message is that as an impetus to innovation, Romanticism was second only to the Enlightenment in helping to set modernity on its way.

The sea or a sunset, a mountain backdrop or a candlelit dinner—when something is particularly beautiful, particularly emotive and charged with positive expectation, it will almost always elicit exclamations of: »How romantic!« Hardly any other period in literary history has immortalized itself in everyday language with as many clichés as Romanticism. And there is hardly any other period about which so many misconceptions still prevail today.

»For example, there is still the idea of the ›dark abysses of the German soul‹ and that these have something to do with Romanticism,« says Prof. Stefan Matuschek. The cliché of the irrational, romantic German soul persists and is said to stem from the shock of the post-war period, in light of the extent of the National Socialists' crimes. »The atrocities of the Nazis were so huge that it was difficult to explain them only on the basis of a government's actions over a few years, which is why German history was examined in search of a breeding ground for these events.«

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The Nazi's crimes as the final consequence of the romantic nationalization of the Germans? This myth, often repeated to this day, is just as untenable as the claim that Romanticism was a counter-movement to the earlier Enlightenment, says Matuschek. The Jena-based expert on Romanticism attempts to dispel such misconceptions in his book »Der gedichtete Himmel. Eine Geschichte der Romantik« (»Poetic heaven. A history of Romanticism«). This volume of almost 400 pages is explicitly aimed at a non-specialist audience and takes a new, contemporary look at the era that has been so misunderstood up to now.

It quickly becomes clear from reading the book that Romanticism is a European phenomenon and that Germans are by no means particularly ›romantically inclined‹. »In addition, the differentiations in European Romanticism do not necessarily run along national borders, but are instead determined by social milieus and periods of history,« says Matuschek. Whereas in Germany, Jena's Early Romanticism (see p. 12) as an academic avant-garde argued about Kantian philosophy with the established Enlightenment philosophers, in France and Italy, Romantic authors countered the established academic high culture with folk narratives. »So, when we speak of Romanticism, we may mean quite different European developments,« adds Matuschek.

What is common to all Romantic literature, says Matuschek, is that it answers questions that the Enlightenment left unanswered or brought into the world in the first place. Questions on subjects such as the meaning of life or what perspective there is after death are of central importance to modern humans, but there can be no empirically verifiable answers to them. Instead of diverging into a fateful irrationalism, the legacy of Romanticism is to offer humans a method for using their imagination to answer these questions and to build »imaginary castles in the air«, and, in doing so, to realize—in an enlightened way—that they are just castles in the air. Instead of being a counter-movement to the Enlightenment, Matuschek's message is that Romanticism is a progressive movement that shapes modern consciousness with its own independent creation of meaning just as much as the Enlightenment itself.

Matuschek's book shows how Romanticism not only breaks new ground in literature, but also influences the visual arts, music, science and politics. Above all, however, it is a vivid foray through the varied literature of Romanticism: from Novalis's »Blue Flower«, through the »Romantic classics« Goethe and Schiller, from the world-weary literature of Chateaubriand and Lord Byron, through the »fragments« of Jena's early Romanticism, to the fantastic tales of E.T.A. Hoffmann, the fairy tales of the Brothers Grimm and the Gothic Romanticism of works such as Mary Shelley's »Frankenstein«. US

Romanticism around the world

In the »Romantic Model. Variation—Scope—Relevance« Research Training Group (see p. 19), young researchers are proving that the ideas which emerged over 200 years ago are still very much alive today. They are bundling romantic elements to create models and analysing how these are being employed and expanded today. The Research Training Group has created an interdisciplinary platform for a broad range of projects that show how Romanticism is a fairly timeless and limitless topic—here are three examples.

BY SEBASTIAN HOLLSTEIN

Annika Bartsch: The great longing

Dr Annika Bartsch (pictured right) explains the starting point of Romantic thought: »Romantics are driven by the longing for a supreme principle which underpins everything—but which is out of human reach. It is beyond our comprehension and perception. We are left with the feeling of a void, an existential lack. This sets in motion the permanent search of the Romantics«. As part of her doctoral thesis, she investigated the way in which this is addressed and expanded in contemporary German literature.

»Even today's authors repeatedly refer to the ideas that emerged 200 years ago, often in relation to social upheavals,« says the literary scholar. »This reference to the Romanticism model has been booming again, especially since the start of the 21st century«. Society is becoming more diverse. Areas such as culture, media and science each have their own set of values for the individual. The strong particularization and fragmentation of society, compounded by an emphasis on individual freedoms, is raising more questions than answers.

In this state of disorientation, in which parallels can be drawn to the situation around 1800, when earlier explanatory models were supplanted, inter alia, by the Enlightenment, Romanticism may offer a way out. Because then we do not have to permanently make decisions as individuals—such as in our career paths or in the supermarket—but experience fulfilling moments of unity in our insatiable search for a supreme principle. For example, we can experience this in nature when bathing in the woods or simply watching the sunset.

PHOTO: JENS MEYER

This model is encapsulated by one of the most widely read books in Germany in recent decades: »Why We Took the Car« by Wolfgang Herrndorf. In addition to works by Felicitas Hoppe, Helmut Krausser and Hans-Ulrich Treichel, Annika Bartsch analysed Herrndorf's coming-of-age novel, published in 2010, as part of her doctoral thesis, where she presented how much the narrative is imbued with Romantic ideas. »Two boys embark on a journey into the unknown and are confronted with the mystery of growing up—there are clear Romantic references there,« summarizes the doctor of German studies, who wrote an essay on the book entitled »Zwei ›Taugenichtse‹ im geklauten Lada« (»Two ›Good-for-Nothings‹ in a Stolen Lada«), with the title referring to Joseph von Eichendorff. The structure of such a journey has always created an environment in which, not least, natural phenomena such as the spectacle of a starry sky allow us to experience a deep longing for the supreme principle.

This longing for the Absolute continues to be expressed in contemporary literature through the use of literary means that were employed by Romantic writers around 1800. If, for example, a clear statement is refused through the use of irony, thus juxtaposing an assertion and retraction, a state of limbo is created. »When the two heroes in ›Why We Took the Car‹ gaze at ›the stars with their incomprehensible infinity‹ and wonder whether there is something up above, the choice of words in the text —and the emotions experienced by the young boys—creates the impression of a greater meaning. However, the scene is ironically broken off because their ponderings about this certain something actually arise from their fanciful imagination of insects on other planets. In other words, an absolute principle is neither explicitly accepted nor refuted—instead, the text reinforces the sphere of possibilities, the feeling of emotion experienced by the boys at that moment,« says Bartsch. »Felicitas Hoppe even makes this state of limbo the leitmotiv of her novel ›Paradiese, Übersee‹«.

MODELL ROMANTiK
Variation · Reichweite · Aktualität

The Research Training Group has been funded by the German Research Foundation since 2015. The current second funding period will last until 2024. Fourteen doctoral students are currently working in the Research Training Group—the third cohort to take part in the study programme. Researchers from the fields of literature, linguistics, music and art studies, history, theology, computational linguistics and sociology are participating in the research group and, together with partners from Jena, Germany and all over the world, they are investigating Romanticism as an epoch-spanning European and non-European phenomenon. In doing so, they use models that reduce historical Romanticism to its essential characteristics and content. In this way, the researchers are trying to identify the patterns of Romanticism in the modern age—even where they are not obvious at first: in current politics, the perception of nature in urban spaces or the management of the climate crisis.

»Writers are not necessarily aware of the fact that they are using Romantic ideas and means in their works. Romanticism is a model that is so deeply rooted in contemporary culture that we can all unwittingly draw on such ideas—even if we do not call this romantic,« says Annika Bartsch. »Herrndorf's texts can be described as Romantic, even though the historical movement is not explicitly named or referenced in his works. Helmut Krausser, on the other hand, makes a Romanticism researcher the hero in his novel ›Thanatos‹,« explains Annika Bartsch. »However, the different forms of representation show that Romanticism, as a way of understanding oneself and the world, is interesting for the individual to deal with experiences of particularity on the one hand and the longing for a greater meaning on the other—200 years ago as it is today«.

Luisa Turczynski: Experiencing nature in the Anthropocene

The literary genre of »nature writing« is also highly contemporary. This is where people embark on an expedition, hike in a forest or track animals and then write about their experience. The description of completely subjective interactions with »green environments« is a literary tradition that is particularly rooted in the English-speaking world. The supposedly untouched wilderness of North America inspired many authors to reflect upon their relation to nature as soon as the continent was discovered. »Landscapes and vastness became a source of reflection for the budding national consciousness and the exploration of one's self,« says Luisa Turczynski (pictured right), who is dealing with nature writing as part of her doctorate.
»This intense preoccupation of nature, partly influenced by the writings of Jena's early Romantic Friedrich Wilhelm Joseph Schelling (see p. 13), gave rise to new philosophical and literary movements such as transcendentalism, which is still a prominent school of thought today«. Its exponents, arguably the most famous being Henry David Thoreau with his work »Walden«, propagated a lifestyle at one with nature and an individual experience of religion in which nature plays a central role.
Since the late 1970s, literary scholars have increasingly questioned the various Romantic depictions of the relationship between people and nature. After initially being celebrated with great enthusiasm, Romanticism was later received in a rather differentiated way. »As highlighted by some exponents of ecocriticism, Romantic nature writing often idealizes nature as an untouched wilderness in which people have no place and are rather disconnected from it,« says Turczynski. »That's why they are trying to find out what literature can do today to allow us to interact more responsibly with nature, especially in the shadows of the climate crisis«.

PHOTO: JENS MEYER

As part of her doctoral thesis, the specialist in North American culture and literature is exploring this critical, changing view of continuously used Romantic modes—with a special focus on an explicitly female perspective on the topic. »Feminist interpretations have criticized the fact that canonized nature writing, rooted in Romanticism, is a male-dominated genre in which an author stands up to nature and exploits it as a spiritual realm for transcendental experiences or self-affirmation,« explains the literary scholar. »In contrast, female writers are often assigned a different, essentially ›female‹ way of experiencing and depicting nature, which is supposedly based on a more empathetic identification with it«.

For Luisa Turczynski, however, this interpretation restricts access to an ecological conception of literature. That's why she wants to move away from this binary, gender-based dualism in her work. To do this, she is condensing the commonalities of the juxtaposed self-nature concepts to create a model that focuses on the continuity of Romantic thoughts and depictions. Based on novels written by the female authors Ibis Gómez-Vega, Barbara Kingsolver and Abi Andrews, she is then analysing the extent to which these thoughts and depictions can be found in contemporary literature. She has come to the following (tentative) conclusion: »Women do not necessarily write differently about nature because they are women,« says Turczynski. »Rather, their depictions of nature change according to the historical context. For example, female authors use experiences of nature as a means of expressing female emancipation narratives and sometimes employ Romantic—supposedly male—elements in their writing«. In Ibis Gómez-Vega's novel »Send My Roots Rain«, for example, the author portrays wilderness somewhat romantically as a place in which to ultimately explore oneself, experience transcendence and discover spiritual awakening. However, it is precisely that experience of nature that empowers her female protagonist to acknowledge her homosexuality and rebel against the prevailing patriarchal order.

PHOTO: JENS MEYER

Pascal Ongossi Assamba: Romanticism and colonialism

Reflections on seemingly untouched nature—albeit on a different continent—similarly feature in another research project. Original refuge from civilization, a transcendent idyll and an enchanted natural kingdom with an eerie fascination… Romanticists saw all of this in the forest, a place that encapsulated their longing. And this is also what German explorers and colonizers felt in the tropical forests of Africa. They were inspired by the unspoilt nature of the landscapes they encountered for example in the territory of present-day Cameroon. Their affinity with the ideas of Romanticism is reflected by the descriptions of nature found in their writings. Since 2018, Pascal Ongossi Assamba (pictured left) has been studying these aspects and various other elements to explore the connections between German Romanticism, colonialism and the national consciousness of Cameroon.

»The idea of coming to Africa and building a colonial empire was strongly influenced by the spirit of nationalism that had emerged during the Romantic era through the wars of liberation against Napoleon,« explains the researcher from Cameroon. This nationalism, which can be traced back to the writings of Romanticist masterminds such as Johann Gottlieb Fichte, drove the Germans to colonize Cameroon in 1884. »They intended to establish Cameroon in Germany's image as a strong country in the middle of the continent. Although ›establish‹ isn't really the right word—they invented Cameroon as the concept of a nation,« says Ongossi Assamba. »Driven by the Romantic concept of unity, they mapped out a territory, indiscriminately bundled together different ethnicities into a people, installed a government and cobbled together the construct of a national spirit through Christian missionary work«.

The sentimentality with which they shaped life in the colony was deeply connected with Romantic ideas. On the one hand, they inspired the writings of Germans in Africa, such as those composed by former governors, who praised the simplicity of life while criticizing the westernization of the so-called indigenous peoples. On the other

Often described as a landscape of romantic longing: the »mystical« forest. · Photo: Jens Meyer

hand, native authors present romantic descriptions in their works and mention historical facts from the era of German Romanticism, such as Jean Ikellé-Matiba in his novel »Cette Afrique-là!« (1963), which was then translated into German as »Adler und Lilie« (1966), in which the protagonist portrays his experiences in a colonial school. This work has a special place in Ongossi Assamba's work, as it offers an insight into how the natives were taught the Romantic relationship to nature, self-consciousness, German history and the Romantic ideology, and how they perceived that ideology.

The Cameroonians' struggle for independence from their French and British colonial masters, who had taken power after the First World War, was partly fuelled by the nationalism that had previously been established by the Germans. »Today, the Cameroonians identify more with the invented state than with the different ethnic groups to which they belong,« explains the specialist in German studies.

In addition to German colonialism, Pascal Ongossi Assamba is also investigating a completely different movement that brought Romantic thought to Cameroon. »Négritude, a literary and political movement that advocated the cultural self-assertion of the African population, was pervaded by Romantic ideas,« says the literary scholar. One of its pioneering exponents, the poet and later President of Senegal Léopold Sédar Senghor, was strongly influenced by Leo Frobenius. The German ethnologist identified striking similarities between the Germans and sub-Saharan Africans in their rather sentimental view of the world. He saw their close connection to forests as an indication of this. ■

THREE QUESTIONS TO

Prof. Dr Johannes Grave

Art historian and Romantic art expert

What can we learn from Romanticism to tackle current challenges such as the climate crisis?

Grave: That's a difficult question, so my answer here is a lot shorter than it could be… Perhaps Romanticism will help us gain a better understanding of our ambivalent attitude towards nature. We are part of nature and dependent on it, but, at the same time, we are also able to reflectively distance ourselves from it. We are potential »victims« of nature, as we are exposed to its forces, but we are also »perpetrators«, as we transform nature and sometimes make irreversible interventions. In our discussions on the climate crisis, we may be paying too much attention to one of these aspects to the detriment of others.

What role do images play in people's interaction with reality today?

Grave: The flood of images with which we live and communicate may numb our senses in some way, but they also have a major impact on our perception of the world and our discussions. What is presented by an image often seems immediately plain to see—but that is by no means the case. This makes it all the more important that we learn how to deal with images critically, i.e. that we work on our »image literacy«. Then we will not only understand the problems and dangers of an all too naïve view of images—we will also develop a clearer impression of their potential. After all, images can do so much more than depict something—they can become real instruments of thought if you know how to use them.

How do you think today's images will be viewed in 200 years' time? What will people infer about us from our images?

Grave: We can't really anticipate that because it is difficult to predict which images will actually be handed down and which (computer-aided) methods will be used to view images. However, it seems quite possible that many of our images today will be perceived as symptoms of problems that we are perhaps not yet able to see with such clarity. For example, where we currently see Instagram photos of people set against a landscape and feel like they have a special interest in being close to nature, we might perceive this as a disconnection from nature in the future.

Prof. Dr Johannes Grave at the university's collection of paintings. · Photo: Jens Meyer

The new freedom of vision

The Romantic era came at a time of upheaval and change in which artists across Europe were confronted with social transformations that inspired their work. What similarities and differences can be identified in their pictures? This question is being investigated by art historians at the University of Jena—the place where Romanticism began.

BY IRENA WALINDA

Is there such thing as »European Romanticism« in the visual arts? Or were there actually several independent Romantic movements across Europe? What do artists such as Caspar David Friedrich, William Turner, Eugène Delacroix and Francesco Hayez have in common?
»The question of a pan-European perspective on Romanticism has long been debated in literary studies,« says Prof. Dr Johannes Grave, »but this is far less obvious in the field of visual arts«. The professor of early modern art history refers to one single exhibition entitled »The Romantic Movement«, which was shown in London in 1959. This exhibition, along with a few other sporadic publications, have been unable to provide an adequate answer as to whether there was such thing as »European Romanticism«. That is why Grave and his team of researchers have set themselves the challenge of developing a European perspective in the framework of a project called »European Romanticism or Romanticisms in Europe?«.

The first rays of the modern age

Romantic artists travelled all over Europe. William Turner, a Romantic artist from England, walked along the Rhine and portrayed the river in many of his works. Most painters spent periods in Italy—that was almost a staple of the artist's diet at the time. There were even connections and interactions beyond the realms of art—Johann Wolfgang Goethe knew and treasured the »Faust« lithographs created by Eugène Delacroix. »But regardless of whether the artists knew one another, they must have faced similar changes and challenges that may have prompted similar attempts at finding solutions,« suspects Grave.
»The French Revolution was certainly a binding and decisive event«. This is the first time it became clear that the centuries-old monarchical order could be supplanted by another form of society. After being shaped by princely rule and the Church in previous eras, society entered a period of dynamic transformation. »A further change in the ways people thought at the time can be observed in the field of philosophy, which was given a whole new foundation, especially inspired by Kant.
What these historical and intellectual upheavals have in common is the fact that they changed people's perception of time. The contemporaries around 1800 experienced their future as more open than before. It now seemed as though people could shape their lives to a much greater extent, but they also faced greater uncertainties«. Many artists experienced this upheaval together—regardless of the countries in which they lived. These new experiences seem to be reflected in pictures from the Romantic period. The artists no longer only attempted to convey a certain message, but challenged viewers to complete the work of art with their own perception.

The time of perception

So, it would seem that the focus of many Romantic artists was not to communicate a certain thought, but to stimulate personal reflection in the eye of the beholder. »A considerable number of artists around 1800 created images that demand a lot of time and do not elicit a clearly definable conclusion when viewed. Romanticists seem to have recognized the special potential of images to stimulate reflection and used this in a targeted manner,« says Grave. In his opinion, Romantic painters tried to keep the viewer's attention for as long as possible. »The more time had to be spent looking at a picture, the stronger the impression that the picture held power over the viewer«. The painters would

Art historian Prof. Dr Johannes Grave in the »Park an der Ilm« in Weimar. The park is designed in the style of an English landscape garden, offering its visitors evocative encounters with nature. · Photo: Jens Meyer

use different visual strategies for this. The research group is currently exploring these strategies based on case studies on individual artists.

Landscapes and the freedom of vision

The choice of pictorial genre may have played an important role. »As a pictorial genre, landscapes were more important in the Romantic period than in other eras,« says Grave. According to him, this was no coincidence. Grave posits that landscape art enables a new freedom of vision, because it is based on fewer narrative elements. Romantic pictures were not necessarily intended to »achieve an objective or provide the viewer with a message to take home, but rather to facilitate an aesthetic experience which, in and of itself, can be perceived as meaningful—not because it offers special insights, but because it unfolds on a personal level in the eye of the beholder«. This hypothesis is substantiated by the writings of artists such as Philipp Otto Runge and Caspar David Friedrich.

A similar demand for a new aesthetic experience can be found in the English landscape gardens, whose form and style were shaped in the 18th century. »For example, anyone who visits the Ilmpark in Weimar does not usually have a specific objective in mind, but simply wanders through the park and enjoys the moods evoked by their visit,« explains Grave.

English landscape gardens and the freedom of movement

The gardens were specifically designed to create a new freedom of movement. The routes are not very predictable, the views are evocative and surprising, the flora seems »more natural« and the park landscape is picturesque. Romantic artists were able to pick up on such experiences: While landscape gardens offered a new freedom of movement, pictures from the Romantic period opened up a new freedom of vision.

Grave and his team are exploring these hypotheses here in Jena—at the place where Romanticism in literature originated. The university, which has a European Romanticism Research Centre, is the perfect place for scholars to come together and exchange ideas on Romanticism. The development of a pan-European perspective on various aspects of the Romantic era is ultimately being facilitated by the cooperation between members of the research group, the Research Training Group »The Romantic Model. Variation—Scope—Relevance« and the »Practices of Comparing« collaborative research centre at the University of Bielefeld, in which the Institute for Art and Cultural Studies in Jena is involved. Their first attempt will be an international conference in autumn 2022. ■

Romanticism favours »as well as« approach over »either or«

Caspar David Friedrich is one of the most important painters of German Romanticism. What can his wild, mist-shrouded landscapes and the people in them tell us today? Our author gained an impression of this in an interview with art historian and Friedrich expert Johannes Grave.

BY MARCO KÖRNER

A man in an old-fashioned-looking dark green frock coat stands on a brown rock formation. He is leaning on a walking stick and looking down on mountains shrouded in fog. What I see in the picture does not exist in reality, Prof. Dr Johannes Grave explains to me as we talk about the painting »Wanderer above the Sea of Fog« by Caspar David Friedrich. This, precisely, is one of the messages of Romanticism, as I come to understand better in the course of our conversation. The questions from this artistic period that art historian Grave is grappling with are particularly relevant to us today, at a time when we are changing nature to an unimagined extent.

Composed imagery instead of a reproduction of reality

Caspar David Friedrich painted his »Wanderer« around 1817. The entire painting is composed. »The two darkly protruding mountain slopes on the right and the left meet exactly in the centre of the picture, where the person is standing looking at the landscape,« describes Grave. A rock formation on the right of the landscape recalls the shape of the wanderer's head. »There was clearly an organizing hand at work in this seemingly untouched natural scene.« In other words: Friedrich made use of precise studies of nature, but he simply made up their composition. And what is more: »Friedrich clearly emphasized this imagery, that is to say, the difference from reality,« says Grave. Okay, I say to myself. A picture of a landscape is not a landscape. And what is realistic about a painted landscape anyway?

The conversation with Grave about this painting, which is more than 200 years old, sparks questions about the relationship between humans and nature that are still valid in the present day. After all, we're changing our environment to such an extent that the current epoch of our planet is called the Anthropocene—the Human Age. How we deal with this is one of the most important questions of our time.

»On the one hand, humans are part of nature, but at the same time they can reflect nature and see themselves as its counterpart,« Grave explains. »Romanticism is perhaps the first movement to consistently scrutinize this relationship.«

At the same time, he warns against viewing the Romantics from this contemporary perspective merely as early environmentalists. »Novalis, one of the leading Romantic poets, worked in the mining industry. And at that time, hardly anyone thought that people could interfere with nature as much as we do today. What the Romantics did was to reflect on the ambivalent relationship between humans and nature. They asked questions such as: what does it mean that on the one hand we are unquestionably part of nature, but on the other hand our ›spirit‹—to use a term from around 1800—can be understood as being the opposite of nature? How should we think about the unity—and at the same time the difference—between nature and spirit, and what are the consequences of this for our dealings with nature?«

Such questions continue to move us today. »In dealing with the climate crisis, for example, there is a type of solution that I would call technological and instrumental,« says Grave. »In this approach, the human being is seen as a mastermind, the sovereign homo faber who actively changes his environment according to his own ideas and who only has to make certain technical adjustments in order to do so. However, the image of Goethe's ›Sorcerer's Apprentice‹, who sets in motion a process that he can ultimately no longer control, would perhaps be more appropriate. Romanticism reflects our position in nature and the great extent to which everything is intertwined. It moves away from limiting itself to single, empirically provable causalities to acknowledge virtually infinite interactions.«

Dual perspective—observing the observer

I notice that when I look at the »Wanderer above the Sea of Fog«, I actually see not so much the landscape, but the person who is standing in front of it and is at the same time part of it. »That is the aim of the picture,« says Grave. »The painting is often interpreted in such a way that we are supposed to identify with the observer and experience nature as an occasion for sublime experiences. But that misses the real point of the painting.«

While I want to look at the landscape in the painting, I realize that the person depicted is not only blocking my view—ultimately, that person is what I'm looking at. Now it is clear to me that the deliberately composed lines in the painting are meant to direct my gaze to that very person. »I become the observer of the observer,« is how Grave describes my experience.

The ruggedness of the landscape reminds me of images of open-cast lignite mines and people standing in them or on the edge of the pit to draw atten-

The painting »Wanderer over the Sea of Fog«, to which the photo on the cover of this magazine also refers, painted around 1817 by Caspar David Friedrich. · Copyright: bpk / Hamburger Kunsthalle / Elke Walford

tion to the harmful consequences of coal mining for the environment and the climate. These pits are man-made, but not designed according to aesthetic criteria. Grave agrees with me on one point: »An open-cast lignite mine has something excessive in its dimensions; it shares that with nature, insofar as nature appears sublime, because it is not attuned to us in size and dimensions. And experiences of the sublime such as these greatly fascinated contemporaries around 1800, especially the Romantics.« Grave makes it clear that the comparison with open-cast mining is nevertheless misleading: »The images created by climate activists in open-cast mines follow a completely different logic, namely the laws of political communication. In that case, it is about an emphatic signal; an unambiguous message is conveyed. Romanticism instead emphasizes ambiguities, multiple meanings.«

In his estimation, the ability of the Romantics to deal with ambiguities also enables them to take a critical look at an unrealistic naivety, which he suspects exists at least in parts of the climate justice movement. »There sometimes seems to be an ideal expressed there that we should only intervene in nature as little as possible. But we are now in the Anthropocene. And there is also no going ›back to nature‹, because the traces we have left up to now cannot be erased and nature as such is constantly changing.«

Alternatives to the here and now— Romanticism creates new scope for reflection

Romanticism therefore does not mean idealizing nature in its supposedly pristine state, but rather dealing with our relationship to it, says Grave. »This is also true of our relationship to the past. Romanticism can be understood as the first modernist movement to reflect critically on its own new era in a very fundamental sense. If Romanticism looks back to the pre-modern era, it is not in order to search naively for an ideal state there. It is more that in this way, it can think of alternatives to the present—in the knowledge of what went before. In this way, it opens up new scope for reflection.«

At a time when many decisions for managing the crisis are ostensibly without alternatives or alternatives seem to be mutually exclusive, Grave considers a critical view in the spirit of Romanticism worth considering: »Instead of ›either or‹, it would favour ›as well as‹. This is precisely why the medium of the picture lent itself to this, because a painting of a landscape is always both landscape and painted canvas.«

To a certain extent, Romanticism can enable us to train ourselves in two areas: our own tolerance of ambiguity and our willingness to reassess those otherwise tacitly assumed preconditions that have always directed our gaze and our thinking. ■

»Friedrich had quite a sense of humour«

Caspar David Friedrich (1774–1840) enjoyed tremendous success during his lifetime but went out of fashion in his later years. His works were only rediscovered in the 20th century. A new project launched by Prof. Dr Johannes Grave is looking to publish a comprehensive, critical and commented edition of Friedrich's writings.

INTERVIEW: IRENA WALINDA

Mr Grave, what is your project all about?

It is about all the texts and writings in which Caspar David Friedrich expressed himself. Most of the writings are already known and have been printed, but many of them do not meet academic editorial standards—with the exception of the majority of his letters.

Take, for example, the manuscript with the somewhat cumbersome title »Comments on a Collection of Paintings by Mostly Living or Recently Deceased Artists«, in which Friedrich comments on numerous pictures painted by his contemporaries. Here the painter becomes an art critic, which is obviously exciting. Although researchers have long known that many of the paintings discussed must have been created by his contemporaries from Dresden, several others are yet to be clearly identified, because Friedrich anonymizes the artists instead of naming them. We hope to make some progress here. It is also worth pointing out that the manuscript has been printed several times, but it has never been correctly edited from an academic perspective. The orthography has been standardized, the order of the paragraphs is questionable, and certain words and phrases have even been omitted in places. Above all, there is no in-depth commentary that explains individual terms, points out relationships and tentatively identifies as many of the people and works mentioned as possible.

Whose work could this animal painting be? The dog is splendidly painted, as if by XXX, but the fellow who is leading the dog looks as if the dog has painted him.

Caspar David Friedrich in his »Comments on a Collection of Paintings by Mostly Living or Recently Deceased Artists« (mainly around 1830).

What do you and your team want to do differently?

For this manuscript and other texts such as his short writings, poems, prayers, diary entries and letters, we are following strict, uniform and academically correct standards to develop an edition that faithfully reproduces Friedrich's remarks—with all the apparent inadequacies in spelling and punctuation and with detailed comments. Our aim is to emphasize the value of these textual sources and provide a new basis for research.

Why is an edition so important for current research?

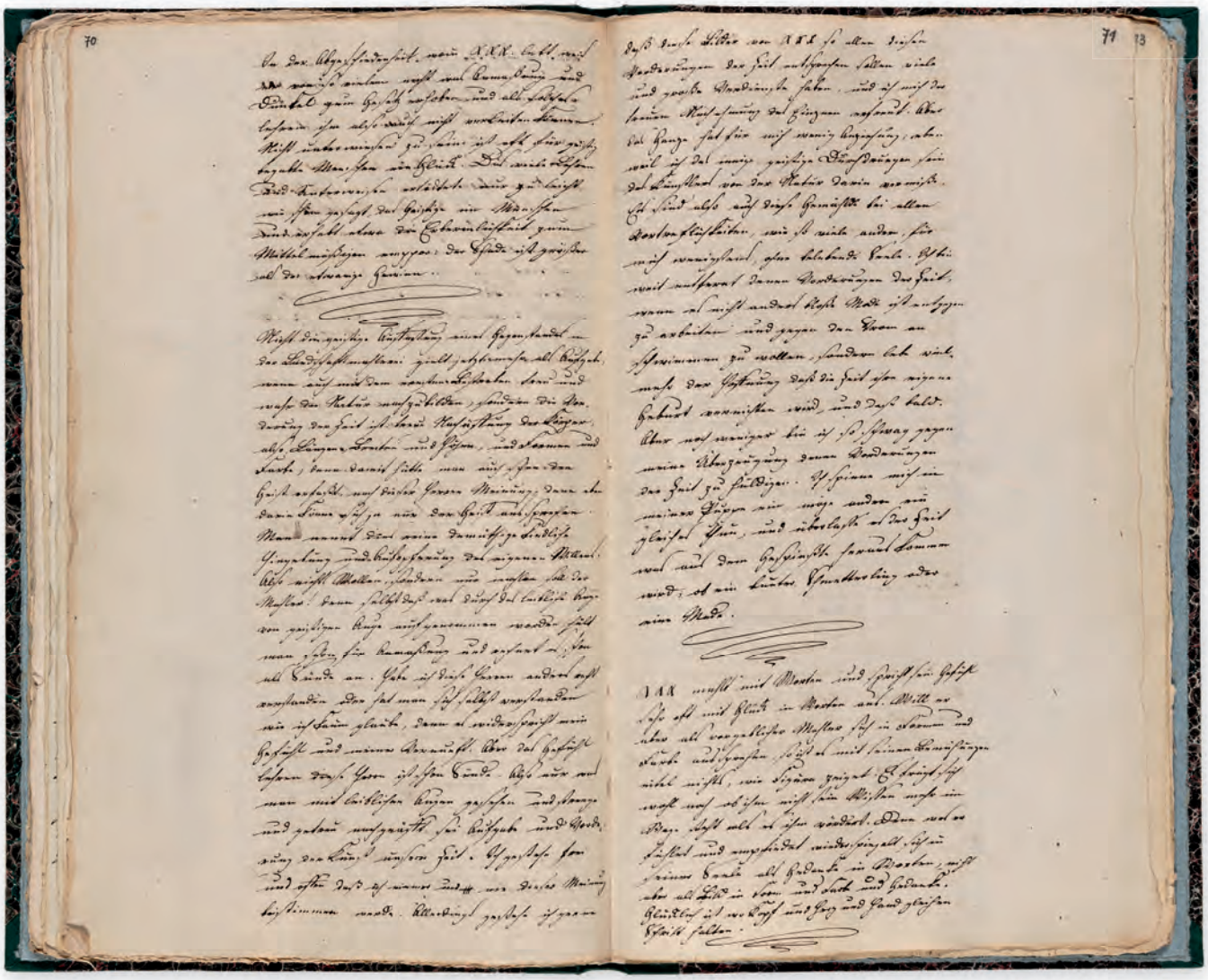
These writings could be important when it comes to researching the painter's works. For example, many Friedrich scholars believe the painter wasn't particularly well educated—more naïve than intellectual. Many assume that he was simply able to express himself differently in his paintings. But if we take a closer look at his writings, we can discover a thoroughly complex, sophisticated and even intertextual use of language. The texts can help us gain a better understanding of Friedrich's paintings and the artist himself.

Can you give an example?

The inadequate examination of Friedrich's texts has led to false assumptions and conclusions. For example, Friedrich has been degraded as coarse and crude for using the term »in Verschiss gekommen«, an expression that alludes to the German word for »shit« and essentially means »out of fashion«. However, such expressions are also found in Goethe's writing. So, it isn't as scandalous as it might sound at first. Here is another example: Some art historians have seen Friedrich's spelling mistakes and incorrect punctuation as an indication of his poor education. But I challenge you to find someone who got that consistently right around 1800. You will be looking for a long time.

Where are the letters and writings kept and/or shown?

The manuscript »Comments on a Collection of Paintings« is currently housed in the Kupferstich-Kabinett (Collection of Prints, Drawings and Photographs) in Dresden. All sorts of smaller texts have been sourced from Caspar David Friedrich's estate. A substantial part of the manuscripts now belongs to the Sax-



View of the manuscript »Comments on a Collection of Paintings by Mostly Living or Recently Deceased Artists« by Caspar David Friedrich © Kupferstich-Kabinett, Staatliche Kunstsammlungen Dresden · Photo: Andreas Diesend

on State and University Library in Dresden. The letters can be found in many different places. Many of them have been bought by the Pomeranian State Museum in Greifswald, most of which are letters addressed to his family. Friedrich was originally from Greifswald, and he often wrote to his brothers. But as is the case with letters, they are often found in the recipients' estates.

Do the letters addressed to his family tell us something about what Caspar David Friedrich was like as a person?

Yes, of course. For example, one letter from 1808 clearly shows how much Friedrich disliked the French, who occupied Saxony under Napoleon at the start of the 19th century. In the letter, he asks his brother, who was staying in Lyon at the time, not to write to him again until he had crossed the border. Friedrich makes it quite clear that he doesn't want to receive any letters from France.

In another letter, he implies that he is afraid his letters are being opened and read by the authorities. That is plausible and not without its dangers, especially as Friedrich occasionally took a stance on political issues. In fact, one of Friedrich's letters even became the subject of an interrogation involving Ernst Moritz Arndt in 1821.

Some of Friedrich's pieces of writing that are most interesting for research include the letters and enclosures in which he discusses his own paintings such as »The Cross in the Mountains« (one of his first major works) or the famous »Monk by the Sea« and its counterpart »The Abbey in the Oakwood«.

In another, he offers a slightly humorous description of his new life as a husband after marrying later in life. »Ever since the I became We,« he wrote to his relatives in Greifswald in January 1818, »a good deal has changed«. Now, when hammering a nail in place, he had to make sure he didn't position it too high up, so that his wife could reach it. So, Friedrich wasn't just the stern and grumpy painter that he is sometimes made out to be. He had quite a sense of humour. ■

Prof. Grave is carrying out his editorial project entitled »The Writings of Caspar David Friedrich and His Dresden Contemporaries« with the proceeds from the Gottfried Wilhelm Leibniz Prize, which he won in 2000. He is co-operating with the Kupferstich-Kabinett as part of the Staatliche Kunstsammlungen (State Art Collections) in Dresden. Prof. Grave is working on the project alongside Dr Petra Kuhlmann-Hodick and PD Dr Johannes Rößler.

The world must be romanticized

Romanticism appears to be enjoying a boom during the coronavirus pandemic. People are going on forest walks, sharing nature photos on social media and finding fulfilment in baking banana bread. But romantic motifs are not only appearing in private life; they are also emerging in society and politics: many people are unsettled and long for an all-embracing community in which they feel connected. Literary scholar and Romanticism expert Dr Sandra Kerschbaumer explains what this has to do with Romanticism and how that era, which dates back more than 200 years, continues to have an effect in our modern society.

INTERVIEW: UTE SCHÖNFELDER

Ms Kerschbaumer, is it a deceptive impression or is Romanticism currently experiencing a boom?
You can certainly get that impression. The term Romanticism is at least often used by people to position themselves, to identify themselves or to set themselves apart.

What exactly is understood by Romanticism in relation to politics?
This varies greatly and is also contradictory. It ranges from the accusation of being inward-looking and escapist, through an emphasis on ironic disengagement, to the connection with nationalism; very different ideas and appropriations are made evident.

Let us first clarify what Romanticism requires of politics.
With a view to historical Romanticism and its writings, I advocate looking less at positions held by individual authors and more at a unifying Romantic way of thinking, which is expressed very well in a text fragment by the poet Friedrich von Hardenberg (Novalis). He called for the world to be »romanticized«. This is an essential point in Romantic thinking: not to limit ourselves to what we can experience in the visible world of the senses, but to seek the connection with something underlying it that is infinite, mystical, mysterious, absolute. However, what is very appealing in the private sphere and in art can become quite dangerous in the political sphere.

In what way?
Because such an aspiration can quickly result in a feeling of insufficiency. In his political texts, such as »Faith and love or the King and the Queen« or »Christianity or Europe«, Novalis transferred the principle of romanticizing to politics: love or a new faith should unite people within a state to create a community and give meaning to their coexistence. A constitution or cold democratic institutions cannot compete with that. Love! Shared beliefs! Meaning! Such demands resulted in an excessively sharp focus on the supposed deficiencies of the bourgeois society that was just emerging at the time, which could only balance individual interests and had no desire to create a community.
Today, we can observe scepticism towards the democratic legal order in many places.

The world must be romanticized. This is how one rediscovers the original meaning. [...] The lower self is identified with the better self in this operation. [...] By giving the commonplace an elevated meaning, the ordinary a mysterious appearance, the known the dignity of the unknown, the finite an infinite appearance, I romanticize it.

Friedrich von Hardenberg (Novalis), Fragment (1798)

Does this mean that early Romanticism supports today's populists and contrarian thinkers, such as the protesters against COVID measures?
One has to concede that early Romanticism in particular was under great tension and caught between contradictions: through the processes of secularization, the slow transformation of the class order into a functionally differentiated social structure, and the French Revolution, a world that had previously appeared to be firmly established lost its central points of reference and deprived many people of a self-evident sense of direction. This explains the impulse of Romanticism to reassemble that which was falling apart, the desire for a meaningful order. This impulse can also be discerned in today's political relationships. There is, for example, a sociological study by the University of Basel that emphasizes Romanticism-related aspects of the world of the »Querdenker«—the contrarian thinkers—where the desire for (quasi-religious or medical) holistic ways of thinking is combined with a contempt for liberal-democratic institutions.
In my view, however, this contrasts with the fact that the Romantic approach is not limited to the desire for a kind of »wholeness«, however this is understood. It was clear to the Romantics that the breakdown of old beliefs

PD Dr Sandra Kerschbaumer is research coordinator of the Research Training Group »The Romantic Model« (see p. 18 ff). Photo: Jens Meyer

and structures not only unsettled people, but also enabled them to develop a new, to use reason and imagination, to gain freedom and to engage in aesthetic experimentation.
The philosophers of that time, above all Immanuel Kant and Johann Gottlieb Fichte, had suddenly placed the subject centre stage, and for the Romantics, too, the self forms a focal point of their thinking. They tried to connect things that differed. Novalis does express his longing for a world—including a political world—supported by meaning. But he presents this in a poetic form and not as a political programme. And the fragment of text quoted presents romanticizing as an activity of the self. In a sense, it is the self itself that first creates the connections that it longs for. Novalis formulates an idea that one can use to orient oneself and makes it clear that the path to fulfilment is infinitely long. These self-reflective moments characterize early Romanticism and anyone who wants to do justice to the movement must always include this aspect.

In addition to the attribution of Romantic principles, there are also people who explicitly claim Romanticism for themselves. For example, the Thuringian AfD party leader and right-wing extremist, Björn Höcke.
Correct, although Höcke fails to recognize specifically the subjective, often ironic aspect. He emphasizes in a one-sided way the longing for being taken into a community and closely links this with the concept of the »people«, which for him has a brutally exclusionary character. In his 2018 volume of talks »Nie zweimal in denselben Fluss« (Never twice in the same river), he describes his notion of a »romantic deep clairvoyance of the Germans«, which is supposed to consist in understanding the »things behind the things« and therefore in looking down on the low points of everyday political practice. Malice against parliamentarism, criticism of capitalism and disdain for democratic institutions are all amplified by Höcke into talk of the »rubble heaps of modernity«. He formulates a highly problematic idea for getting rid of these, namely that what matters is not constitution and procedure, but substance. Höcke writes: »It is not the external forms—which are subject to ongoing natural change—but the inner substances from which the genius of the people draws its strength and which must be preserved.« What are these substances supposed to be? Who controls the genius? And who protects the citizens who do not believe in it? It must be noted that the desire for great and unifying ideas in politics are definitely promoted by a traditional strand of romantic thought.

How could this be avoided?
By realizing that excessive demands on the political system can be exploited by enemies of democracy. That it is not about quasi-religious salvation, but about legal safeguards and democratic procedures.

Why is it that romantic longings and ways of thinking are so entangled today?
Modernity is characterized by social developments to which historical Romanticism reacted at the time and which continue to this day. If we consider the period around 1800, the transitional »Sattelzeit« or threshold period between the early modern age and the late modern age, we can see phenomena such as the restructuring of the social system. We see different sub-sectors of society forming, which follow their own brands of logic: the natural sciences, politics, religion, art. And they all compete with each other by offering different norms, value systems and orientations. The individual is increasingly unbound and free to choose, and is suddenly faced with the task of finding his or her own place and achieving certainty about his or her identity.
This was new in the 1800s, but these are processes that continue to this day. We, too, are facing processes of reconstruction and self-interrogation; truths that were previously believed to be certain are disappearing. We have to find ourselves as individuals and, for all our freedoms, we sense a certain contingency. Because we no longer have a fixed identity determined by birth or the place where we grew up or by our religious affiliation. We have to deal with this uncertainty or fluidity of our own lives, and we can do this by seeking points of reference outside our own lives—or beyond supposedly established truths. This was the case at the time of Romanticism and it still holds true today. ■

The extraordinary in the ordinary

Nowadays, many people associate Romanticism with rose-tinted glasses, sentimental nonsense and red rose petals. However, some of the romantic elements used by Novalis and his contemporaries can also be found beyond such clichés in the modern cityscape. One form of modern romanticization is »urban birding«, a type of birdwatching that originated in the English-speaking world. Prof. Dr Caroline Rosenthal, a specialist in North American literature and culture, explains how contemporary »urban birding« is related to Romanticism.

BY VIVIEN BUSSE

We take the same routes every day, such as when we go to work or the supermarket. It may seem like a pipe dream for us to encounter romance on our daily routes—right in the middle of a concrete jungle. Isn't Romanticism about daydreaming and glorifying the vastness of nature? For Novalis, however, the essence of Romanticism is »finding the extraordinary in the ordinary«.

This is the view taken by »urban birders«. While city and country were seen as polar opposites in Novalis' day, the lines are now blurred. Nature has found its way into the city. And in this sense, »urban birding« is about perceiving nature in the city, explains Caroline Rosenthal.

However, we have to consider the much bigger picture to better understand this relationship to Romanti-

Nature, in the middle of the urban environment: a magpie, observed in Paradiespark in Jena. Photo: Doreen Kirsche

cism. »People always tend to appreciate what is being lost and disappearing«, she says. The bird population is in decline: As birds are being increasingly driven out of their natural habitats due to agricultural practices and the use of pesticides, they are adapting to the urban environment and finding more opportunities to live there.

»Urban birding«—nature is bursting onto the urban scene

And this is where »urban birding« comes in. Nature is suddenly emerging in urban environments and the contours between the city, countryside, people and nature are disappearing. Arguably the best-known example, according to Rosenthal, are the pairs of falcons that are breeding in the middle of New York. As a result, even stockbrokers are becoming avid birders and watching the falcons in their lunch breaks.

This is a Romantic phenomenon—people are now discovering the extraordinary in their ordinary environment. It should also be pointed out that Romanticists viewed birds as a symbol of wildness, a concept synonymous with their inherent freedom, as they do not surrender to the will of people in a man-made urban environment, explains Rosenthal.

»Urban birding« is also on the rise in Germany. It is not about being able to differentiate between different species or lurking with a pair of binoculars. It is about reinterpreting our own living space as a habitat for a wide range of organisms.

The re-enchantment of nature

»Our urban space is being romanticized because the intrinsic value of natural habitats is suddenly being brought into the city«, says Rosenthal. This is a form of »re-enchantment«, as nature is perceived differently in urban environments. »And everyone can consciously perceive this re-enchantment«, she states. On the way to university or work, we can suddenly see the flowers by the side of the road or the colourful display of the autumn leaves with a new set of eyes. ■

American studies professor Dr. Caroline Rosenthal is not a »birder« herself. However, as part of the seminar on »Literary Ornithology«, she discussed with students their experiences with »urban birding«. · Photo: Jens Meyer

»We have to know and recognize our own history of thought«

The spirit of 1800 can still be felt in many parts of the university. Tourists from around the world follow the trail of earlier days. Visitors from Germany and abroad come to Jena to discover the living and working environment of Romantic personalities. One of the people they often come across during their visit is Dr Helmut Hühn. As head of Schiller's Garden House and the Goethe memorial (which is currently being transformed into a »laboratory«), and as a co-founder and head of the »European Romanticism Research Centre«, he is involved in researching and communicating ideas from around 1800. In this interview, he explains why Schiller's Garden House is also a Romantic place, what we can still learn from previous conflicts and how he manages to convey the ideas of great intellectuals like Schiller and Goethe.

INTERVIEW: SEBASTIAN HOLLSTEIN

Why are places like Schiller's Garden House in Jena so important for gaining a better understanding of Romanticism?

Schiller was driven by a fervent belief in the humanizing and social function of art. His programme of »aesthetic education« was an essential source of inspiration for the Romantic agenda. The early Romanticists tried to reflect on the modern world and heal its wounds. With critical reference to their own times, their thoughts and actions were geared towards (re)establishing the bonds that connected people with themselves, with others and with nature. Every individual was supposed to be a whole person and realize their own unique individuality. The Romanticists advocated for a society built upon the pillars of love and cooperation which was not to be torn apart by division, egoism and competition.

In places like Schiller's Garden House in Jena, we learn how to move between eras and not be tied too strictly to the present day. We wonder how Schiller might have lived here with his family, how he might have structured his everyday life and work, how he might have shaped his surroundings. We read the letters that he wrote and received, we look at his calendar and Goethe's diary and discover what he thought and wrote here during the summer months from 1797 to 1799. The atmosphere of a place with such tangible layers of history engenders a very special productivity. The fact that you can visit such historical places is one of Jena's advantages as a place of study—they provide a space for reflection, interaction and dialogue, and inspire lively and creative conversations. A number of doctoral thesis projects have even been conceived over there (pointing at the bench in front of a small tower known as »Schillers Gartenzinne« or »Schiller's Merlon«).

You co-founded a central institution, the »European Romanticism Research Centre«, in 2010. What is the idea behind that?

By founding the research centre, we were able to continue the work of the collaborative research centre known as »Weimar-Jena. Culture Around 1800« on a smaller scale and consolidate Romanticism research in Jena. Our aim was to further internationalize the research, with particular attention to European exchange relationships and interconnections. We also wanted to introduce a more interdisciplinary approach and move away from hasty essentializations of the subject, i.e. from the construction of »essential Romantic identities«. After all, there have been conflicting interpretations of the different manifestations of Romantic thought and Romantic representation throughout the past 200 years of engaging this subject. Historicizing, not essentializing, is one of our main ideas.

At the research centre, we look, in accordance with research impulses by Reinhart Koselleck, at the period from 1750 to 1850 as a time of upheavals and transitions that led to the emergence of the »modern age«. With regard to the Romantic movements in Europe, we investigate constellations in art, philosophy, literature, science, religion and society. In doing so, we hope to gain a better understanding of the history of problems that underpin the modern age.

What connections do you make with the present? Why is it important to continue studying Romanticism today?

I am personally interested in historical and cultural conflicts and their transgenerational contexts in the process that is modern age. Such a conflict, for example, is expressed in the radical criticism that philosopher Georg Wilhelm Friedrich Hegel addressed to the Romanticists, especially Friedrich Schlegel: He viewed Schlegel as the representative of a modern mentality that misunderstood the freedom of the sub-

Dr Helmut Hühn in the Ernst Abbe veranda of Schiller's Garden House in Jena.· Photo: Jens Meyer

ject achieved over centuries of struggle, distorting this freedom as arbitrariness and thus losing the ability to mediate with other subjects. Hegel criticized the ironic Romantic subject as one that sees itself as the sole and exclusive decision-making authority for truth, law and duty, and thus undermines the world of legal obligations and moral commitments.

Even though Hegel misrepresented Schlegel's views, there was a real social and epistemological conflict—one that can also be observed today. I don't want to back that up with examples from the pandemic, but the problem, i.e. the arbitrary use of one's own freedom, seems obvious. We, too, are asking how subjective particularity can be overcome, and how intersubjectivity can be lived responsibly. Modern societies face the challenge of justifying themselves on reasonable grounds. In the medium of communication with others, subjects search for procedures to legitimize their orders and their practices. We need a common public in which conflicting views can be formed on the same relevant issues. Schlegel and Hegel experimented with different ways of legitimizing objectivity. But to give you a straight answer, we are not studying Romanticism because we are Romanticists ourselves or because we confuse their world with our own; without an understanding of the problems and conflicts that existed around 1800, we would not be able to grasp how we became the »post-Romantic subjects« we are today. We have to know and recognize our own history of consciousness and thought in order to face the challenges of the present.

How do you manage to communicate Romanticism and its ideas in Jena?

First of all, the keys to all good teaching are in-depth research, careful attention to one's own present and its unresolved problems, as well as genuinely open and engaging conversations. It is obvious that we aspire to address the great period of our university around 1800 in its various facets and in its significance with special competence in teaching and research—in philosophical terms, that is the late Enlightenment, early Kantianism, early Romanticism and early Idealism; in literary and artistic terms, it is Classicism and Romanticism. This should be our ambition. In addition, there is an interdisciplinary cultural transfer that we are able to achieve, especially in special places like the Garden House. It is an internationally renowned literary place that attracts visitors from around the world, whom we are delighted to welcome year after year. We think beyond the present day here.

How do you convey content when attractions such as the Garden House have to remain closed for a long time?

The ongoing pandemic is a long-term disaster that has highlighted the irreplaceableness of personal encounters. As part of the Hölderlin Year in 2020, we had invited poets to readings and planned an international conference with translators of Hölderlin's poems. When our plans were thwarted by the pandemic, we had to transform the project. This resulted in a podcast in which people of all ages—including students, researchers and poets—discuss Hölderlin's work (»Was Hölderlin mir bedeutet« or »What Hölderlin Means To Me«). The participants each read a text by Hölderlin, which then provides an opportunity for them to express their own questions and thoughts. The project has been received with open arms.

We are now thinking about launching another podcast—this time focusing on Schiller. As we look back in the 21st century, what does the university (still) have to do with its namesake? What connects our faculties and current research in various subjects with Schiller? This, we will try to explore during small »expeditions«. ■

»A real heaven of knowledge on earth«

While the poets of the Romantic era were busy exchanging ideas and opening up new intellectual spaces in their salons in Jena, the young researcher Johann Wilhelm Ritter was obsessing over the big questions of the time in his experiments. In doing so, he discovered UV radiation, laid the foundations for electrochemistry and invented the forerunner of today's batteries 220 years ago.

BY SEBASTIAN HOLLSTEIN

»On 22 February, 12:30 pm, horn silver placed in the colour spectrum…«. This is the simple diary entry from the winter of 1801 in which Johann Wilhelm Ritter recorded an experiment that would lead to a scientific sensation. Experimenting in a darkened room, the young researcher refracted the light of the midday sun in a prism and directed the colour spectrum onto a sheet of white paper that was coated with a layer of silver chloride. The salt reacted with the light and turned particularly dark close to the violet end of the spectrum—where no coloured light could actually be seen. This is how Ritter—in Jena—first proved the existence of ultraviolet radiation, which is invisible to the human eye. His experiment was inspired by the astronomer Wilhelm Herschel, who had discovered infrared radiation one year earlier in a similar way, the only difference being that he had measured the temperature instead of observing a chemical reaction.

Johann Wilhelm Ritter, like hardly any other person, embodied the close unity that existed between the natural sciences and humanities around 1800. His research was driven by the search for an all-unifying principle. Jena's Romanticists admired his ingenuity and insatiable thirst for discovery. He had a particularly close friendship with Novalis, who was quoted as saying: »Ritter is a knight and we are mere squires«. Clemens Brentano once described him as the »greatest man of our time«. Even great minds like Goethe paid the young researcher respect. The prince of poets wrote the following in a letter to Schiller: »It was just yesterday that I welcomed Ritter to my abode; he is a phenomenon to behold, a real heaven of knowledge on earth«. Ritter's air of genius may have been reinforced by his living conditions. Novalis wrote about their first encounter in 1799: »At the time he was living in utter seclusion in a remote alley, consumed by a scantily furnished room, which he often did not escape for four weeks; ultimately because he knew of no reason why he should leave and, incidentally, for whom it would be worth the trouble.«

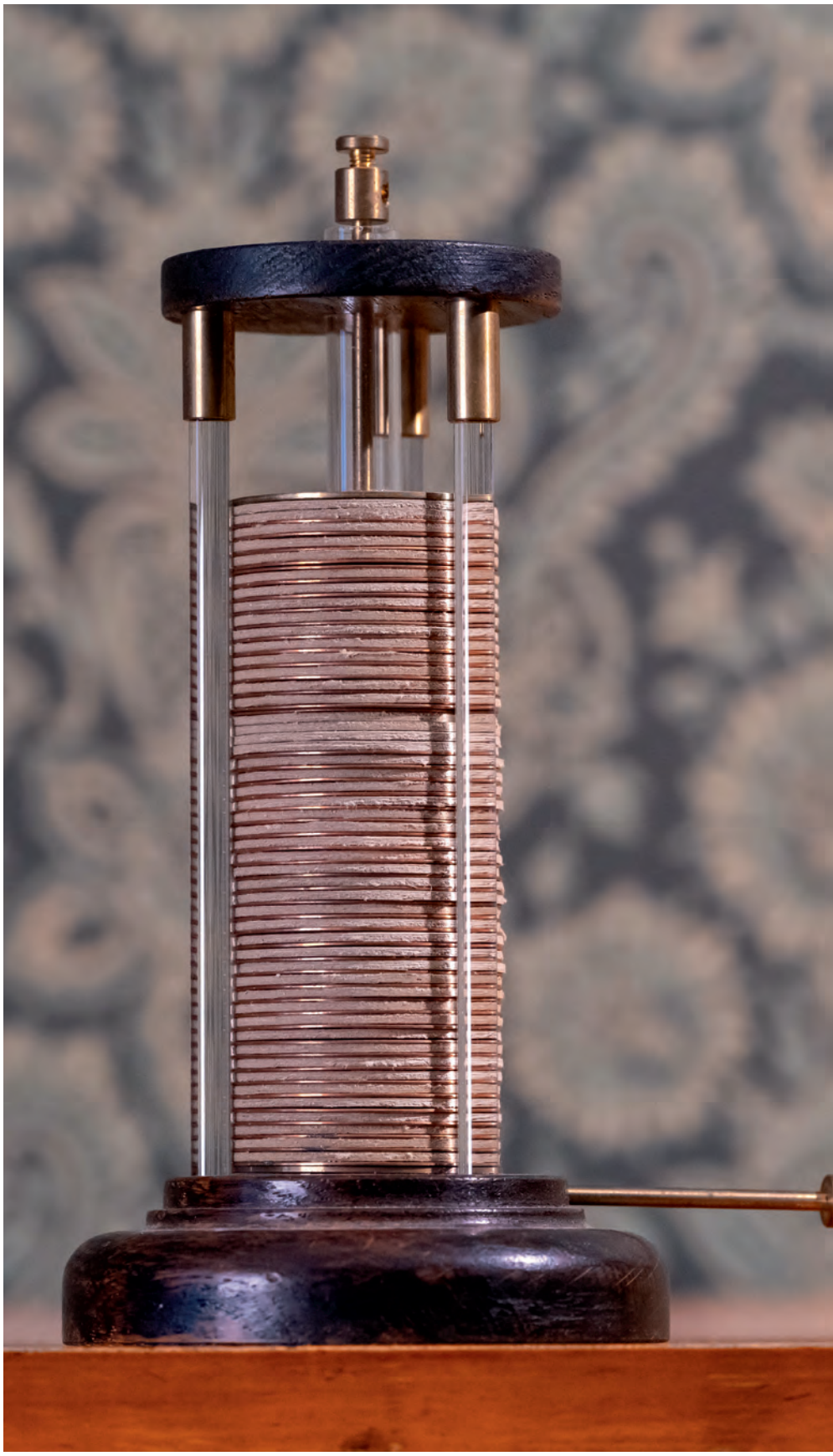
Fascinated by »animal electricity«

Born in the historical region of Silesia in 1776, Ritter enrolled at the University of Jena in April 1796 to study natural sciences. Having trained as a pharmacist's apprentice and journeyman for five years, he instantly plunged into the seething cosmos of science at the »Alma Mater Jenensis«, developing an obsession for experimenting and quickly making a name for himself. As early as 1797, Alexander von Humboldt asked him to proofread his latest work and »record his shortcomings and overly one-sided arguments«. Humboldt's work—like Ritter's own first book (»Evidence that the Process of Life in the Animal Kingdom is Influenced by Constant Galvanism«), published in 1798—dealt with a question that electrified a large audience, even beyond the scientific community: Why do frogs' legs twitch when they are between two metals?

This phenomenon had been accidentally observed in 1789 by the Italian doctor Luigi Galvani, who tried to explain it by postulating an »animal electricity« which could also be found, for example, in electric eels. The idea of a seemingly mysterious force in the body of living beings fell on fertile ground among the Romanticists, as reflected by the novel »Frankenstein« by the English writer Mary Shelley. However, this approach was criticized by Galvani's compatriot Alessandro Volta, who attributed the electricity to metallic contact. Ritter, who had been experimenting in the contentious field of »galvanism« since the beginning of 1797, contradicted them by combining both ideas: He suggested that the voltage differences that generate the electric current were due to chemical reactions between the metal and the electrolyte (i.e. the frog's legs). His investigations make him one of the founding fathers of electrochemistry.

Ritter's charging pile as the forerunner of today's batteries

Inspired by Volta, Ritter followed up with further experiments with electricity in 1802. He made a stack of copper plates and cardboard soaked in hydrochloric acid and conducted a voltage into the experimental set-up using a



Replica of a »dry charging pile« designed by Johann Wilhelm Ritter from the Ernst-Haeckel-Haus collection. Photo: Jens Meyer

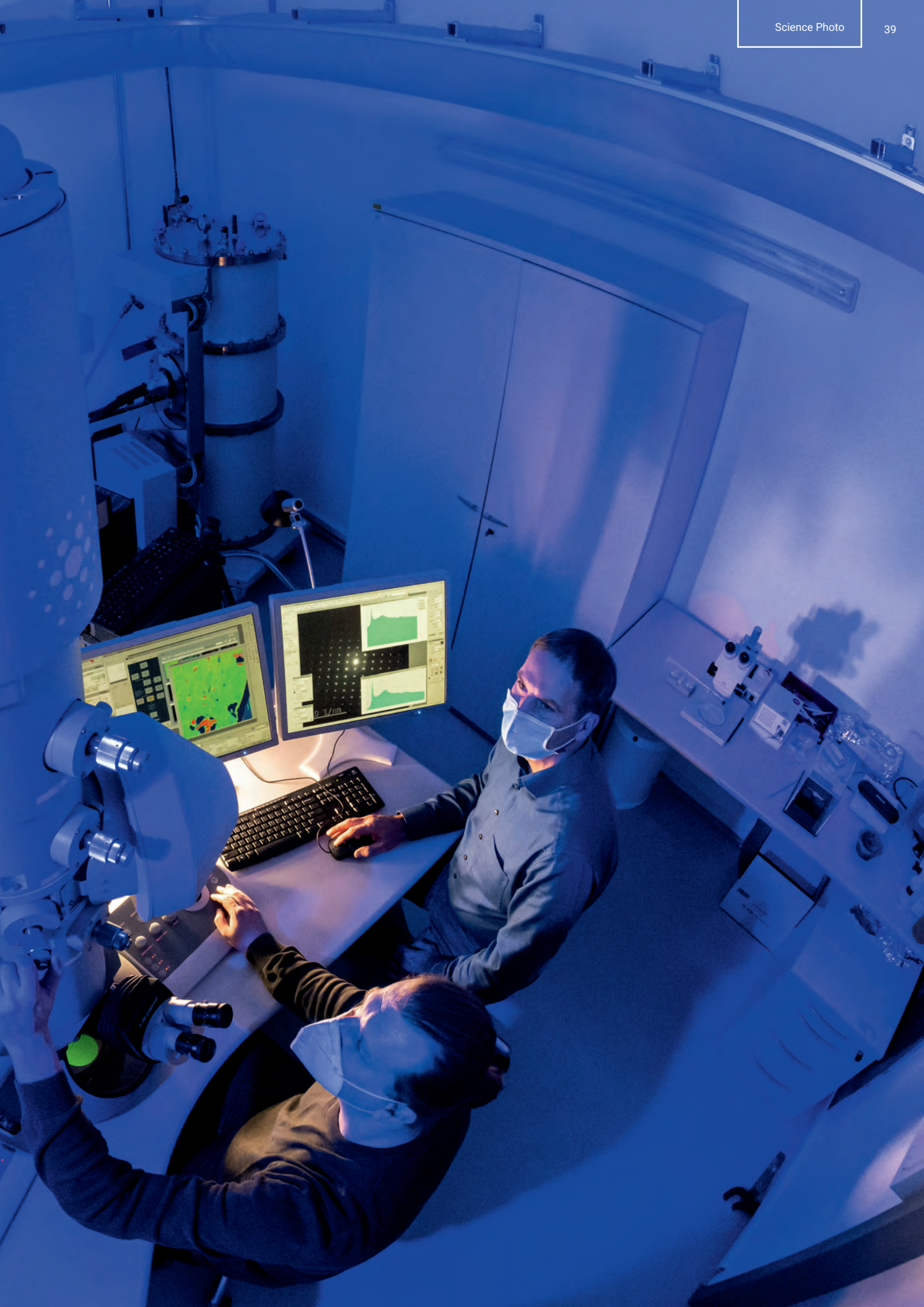
»voltaic pile«. He found that the material stored the charge, released the energy and could then be recharged. That's why Ritter's »charging pile« is seen as the forerunner of today's batteries.

A celebrated scientist with a miserable existence

For all the success Ritter enjoyed in science, his living conditions were simply disastrous. His obsessive experimenting affected his health: He hardly slept, had a weakness for alcohol and didn't shy away from experimenting on his own body during his research into galvanism. He even applied a voltage to his own eyes to observe the effects on his senses. To add to his misery, he was dogged by financial worries throughout his life. He ended his studies in 1798 and declared himself a private scholar. He was a welcome guest at the Thuringian courts between Gotha and Weimar, but he had no regular income. He was refused a lecturing position at the University of Jena, despite his appointment being demanded by students, because he had no academic degree to his name. That's why, in 1805, Ritter moved with his wife and child from the university town in the Saale valley to Munich, where the Bavarian Academy of Sciences and Humanities had offered him a permanent position. However, the change of scenery hardly changed his way of life. Emaciated and heavily in debt, he died on 23 January 1810 at the age of 33. ■

Asteroid dust landed in Jena

Here, Prof. Dr Falko Langenhorst (r.) and Dr Dennis Harries examine rock samples of only a few micrometres in size from the asteroid »Ryugu« with an electron microscope. The researchers hope to gain new insights into the formation of our solar system. The Japanese space probe Hayabusa-2 collected the extraterrestrial material from the celestial body in 2019 and sent it to Earth in a sample capsule.



Why do we need science communication?

Exchanging research results has become a standard practice for today's scientists. Discussing their work with fellow specialists ensures the quality of their own research and helps to generate new ideas. Researchers from our university report here why they also communicate their findings to the general public and how their ideas are received.

SURVEY: VIVIEN BUSSE

PHOTO: ANNE GÜNTHER

Andreas Freytag

PROFESSOR OF ECONOMIC POLICY

My subject is economic policy, a branch of social science relevant for everyone and always linked to the expectation of normative conclusions. Many observers develop a clear opinion—often unchecked by facts and logic. Therefore, I frequently have to debunk myths about economists especially when I talk to colleagues from other scientific fields!

That's where science communication plays a central role. I try to present the results of my research and other people's work in a way the general public can understand, so that people can form their own opinion. This will only work if my arguments are based on evidence and if I avoid unnecessary jargon and defend my views without belittling others.

The vehicles for this communication are columns (»Freytags-Frage«), blog posts, guest articles in daily newspapers, interviews, lectures and—very importantly—public debates. What I enjoy most is convincing sceptics of rational positions.

There's no science without communication. Within the scientific community it's a basic requirement for every discourse. For the outside world, it's the driving force behind the social, technological and political development of society.

By combining my university activities with my work for the Buchenwald Memorial, I act as a liaison between science and the public. The memorial presents research results to the general public in many ways: through publications, exhibitions, group mentoring, historical-political initiatives in the public sphere, educational materials and social media. Each medium has specific requirements for the transfer of knowledge to particular target groups.

The challenge is to convey content in a way that people can understand without reducing its complexity to such an extent that reflective historical awareness is replaced by one-dimensional images of history.

PHOTO: JENS MEYER

Jens-Christian Wagner

PROFESSOR OF HISTORY IN THE MEDIA AND IN THE PUBLIC SPHERE

PHOTO: ANNE GÜNTHER

Annika Klafki

JUNIOR PROFESSOR
OF PUBLIC LAW

Science communication is a small but important part of my work. Presenting my research results to the general public enables me to take part in the democratic processes of decision making. The coronavirus pandemic has created a particular demand for scientific information within society. The restrictions of fundamental rights to curb the spread of the virus raise various legal issues.

Whenever I decide to make my research available to the general public, I publish my work on scientific blogs that are also read by journalists. In case of topical issues this often leads to press enquiries that allow me to reach an even broader audience. There are, however, certain pitfalls when working with journalists: Statements can be shortened or paraphrased in such a way that they become scientifically incorrect. That's why I try to communicate particularly clearly when dealing with the press. I use short sentences and refrain from using technical terms to avoid misunderstandings.

Science communication is an important aspect of my work. As I research major earthquakes, I'm benefited by the fact that many people are interested in my topic. Everyone knows the devastating effects of earthquakes. People often expect science to eventually solve the »earthquake problem«. In such cases, I have to explain that this expectation is wrong. We're trying to gain a greater understanding of seismic activity, but society is responsible for implementing measures based on our findings.

That's why I back up my work with a blog (paleoseismicity.org) and Twitter pages (@ch_gruetze; @paleoseismicity). I also write press releases, give interviews and talk to schoolchildren. The response is almost always positive. However, it is often difficult to explain the limits of our knowledge and uncertainties in a way that everyone can understand. And we're often accused of wasting the taxpayer's money when we don't know anything for sure anyway.

PHOTO: PHILIPP BALLING

Christoph Grützner

POSTDOC IN THE STRUCTURAL
GEOLOGY RESEARCH GROUP

PHOTO: UKJ

Mathias W. Pletz

PROFESSOR FOR INFECTIOUS
DISEASES

The ongoing pandemic proves that ensuring successful science communication is just as important as generating scientific results. What use are the newly developed vaccinations if they're not accepted? What use are the findings on aerosol transmission if they're not implemented?

Over the past two years, I've been able and obliged to learn a lot about science communication. There's an unresolved but crucial question in my eyes: Science thrives on »trial and error« and the permanent discourse it generates. Society is overwhelmed by this discourse and the standard scientific differentiation between an effect size and the strength of evidence—especially when far-reaching political decisions are justified with reference to science. When it comes to communicating our results, the journalistic aspect is a decisive factor that determines the success and failure of science communication. That's why I would like to see a code for scientists and journalists—similar to the one that applies to good scientific practice.

PHOTO: JENS MEYER

Ralph Neuhäuser

PROFESSOR
OF ASTROPHYSICS

It's easy to inspire people with public lectures on astronomy, especially when you have topics such as historical observations of supernovae or Halley's comet and research on exoplanets or neutron stars. However, we shouldn't just present our »nice and exciting« findings. We also have to communicate all our difficulties, our (intentional) simplifications and our uncertainties—all our restrictions and preliminary findings. This can be a sobering experience for everyone interested (e.g. when it becomes clear that not every so-called »exoplanet« fulfills the scholarly definition of a planet—let alone is a »second Earth«).

The history of science, which is full of mistakes and half-truths, should encourage us to engage in an open and courageous discourse—in the community and beyond. And much of today's common knowledge was originally a minority view.

First of all, scientists have to communicate with one another to actually understand something about their subject—and that's difficult enough as it is. But it's a good way for me to convey topics and problems, including the attractiveness of my specialist subject. Every single science has become so complex that it's often easier to communicate with people from your own discipline than with the outside world—and that's a great danger. If we only understand ourselves, we've lost sight of the essentials.

That's why I consider science communication, first and foremost, to be a means of self-criticism. And then I'm sometimes surprised to sense that someone else also finds my subject interesting. Theologians arguably feel this the most when they're preaching, but our university also promotes this feeling during specialist discussions beyond the bounds of theology. And that's one of the »soft« factors that make it plausible for theology to be practised at the university.

PHOTO: JOHANNES U. BECK

Karl-Wilhelm Niebuhr

PROFESSOR OF
THEOLOGY / NEW TESTAMENT

PHOTO: ANNE GÜNTHER

Johannes Kretzschmar

RESEARCH ASSISTANT AT THE
INSTITUTE OF APPLIED PHYSICS

If you'd asked me a few months ago, I would've had much more positive and enthusiastic things to say about science communication. I would've talked about how, apart from press releases and email newsletters, we can address recipients more intimately in formats such as science slams, pub quizzes, Twitter debates, YouTube videos and even TikTok dances—presented personally and directly by researchers who know how to inspire their audience.

However, I've become more critical during the ongoing coronavirus pandemic due to the recent use of scientific knowledge. Results are being politicized far too often and scientists who dare to talk publicly are being met with hostility. This shows there is a particular lack of safe environments for science communication, especially when it comes to relevant issues and target groups.

Anja Laukötter

PROFESSOR OF
CULTURAL HISTORY

Science communication is very important to me. It's not always easy and often takes extra effort—and doesn't always work out as planned. Nevertheless, communicating and discussing scientific findings with the public—and promoting the general acceptance and visibility of science—are important objectives of my historical work.

In recent years, I've tried out a variety of multimedia formats for this purpose, including public lectures, radio and newspaper interviews, panel debates, the organization of public film series with accompanying scientific lectures and the initiation of two online projects: a bilingual web portal called »History of Emotions—Insights into Research« and a blog called »Feeling News« that deals with the social impact of the COVID-19 pandemic. There is also a website for my latest monograph, where many of the films discussed in my book can be accessed.

How is the response? On the whole, it could be bigger. However, I'm learning lots of new things and I'll never stop trying!

PHOTO: ANNE GÜNTHER

Tobias Rothmund

PROFESSOR OF
COMMUNICATION AND
MEDIA PSYCHOLOGY

Science communication is not a one-way street. It is not just about transmitting findings to society as effectively as possible. As scientists, communicating with the general public also teaches us something for our own research. In the social sciences, the reciprocal nature of communication is particularly evident. The quality of research depends directly on how well researchers are able to understand, bundle and structure social discourses. At the same time, research only develops its relevance in social discourse.

Social media are becoming increasingly interesting for science communication. They allow scientists, policy-makers and the general public to share and discuss scientific findings. On Twitter I can point directly to a recent study or engage in a political discourse for which certain scientific findings are relevant.

This form of science communication is proactive, open and tailored to the attention logic of our mediatized society. Of course there are obvious obstacles for science communication in this area: A lack of time resources, politically motivated criticism of science, and the dynamics of outrage are often in conflict with a rational discourse. Nevertheless, I assume that social media will play a central role in the future of science communication.

PHOTO: ANNE GÜNTHER

The »Collegium Jenense« is where the University of Jena was founded. It is the burial place of Ortolph Fomann the Younger and at least 1,500 other people. · Photo: Jan-Peter Kasper

Resurrecting a professor

Ortolph Fomann the Younger died in 1640 and was buried in the church at the »Collegium Jenense«. Now, almost 400 years later, an interdisciplinary team is working on virtually resurrecting the man who taught history, poetry and law in Jena. The experts involved in the large-scale project are literally examining the bare bones of the professor and his contemporaries to reconstruct their everyday lives at the early modern university. Here they offer insights into their workshops.

BY STEPHAN LAUDIEN

Concentration and a steady hand are some of Gina Grond's essential tools. She's wearing nitrile gloves, an FFP3 mask and peering through a large magnifying glass inserted in the middle of a round lamp. The restorer uses a fine brush to carefully spread glue under a layer of paint, then she takes a heated spatula and returns loose flakes of paint to their original position.

Gina Grond is working on a wooden work of art that is roughly the size of a newborn baby. The artwork is a marriage of new life and death, as highlighted by the title on her specification sheet: »Putto mit Totenschädel« (»Putto with Skull«). The carving was part of the epitaph for Ortolph Fomann the Elder, who was a professor in Jena and served as the rector of the university four times between 1595 and 1626. Fomann was buried in the university church (»Kollegienkirche«) on 23 May 1634; the richly embellished epitaph, of which only fragments have been preserved to this day, once reminded posterity of his life and work.

Gina Grond's desk is housed in a workshop in the depository of the Art Collection at the Friedrich Schiller University

Jena: a modest room with white walls and a white ceiling. »It helps us make out different colours,« says Gina Grond. The restorer speaks with respect about the work of art in front of her: »There is its age on the one hand, and the fragility of the material on the other.« The aim of her work is to preserve and conserve the piece. The materials have to be used as reversibly as possible and they have to come close to the originals. As the binding agent contained in the primer and paint has deteriorated significantly over the centuries, Gina Grond is using a type of glue obtained from a sturgeon's air bladder to refortify the primer and layer of paint. This low-stress glue is well suited to such fine work. Once the primer and paint have been refortified, further technological investigations will be carried out and the surface of the work will be cleaned. As an important aspect of her restoration work, Gina Grond keeps a detailed record for every item, where she meticulously documents the prerestored condition, each stage of her work and the materials used. This will provide future restorers with valuable information for their work. »We're all part of a chain. We're not the first to work on the piece—and we certainly won't be the last,« says Gina Grond.

Around 500 burial sites found on the Kollegienhof grounds

The Kollegienhof project (see box on p. 47) is being coordinated by Dr Enrico Paust. The 35-year-old archaeologist is the curator of the Prehistory and Early History Collection at the University of Jena and he manages the professors' graves in the Kollegienkirche. The collection includes numerous finds from the Kollegienkirche and the monastery grounds (»Kollegienhof«). The first excavation inside the church took place in 1936, explains Enrico Paust. After the Kollegienkirche had been destroyed by bombs at the end of the Second World War, the site was cleared and further excavations have since followed, most recently in 2019. »Over 500 burial sites were found on the grounds, and over 1,500 people were buried there,« says Enrico Paust, who led the most recent excavation. Most of the graves belonged to noble students, professors and their families. Numerous burial objects were also recovered, including valuable items of clothing such as coats, shoes and wigs.

Enrico Paust's office in Löbdergraben is just next door to the workshop in which restorer Ivonne Przemuß is examining the burial objects, the items that were given to the deceased on their journey to the afterlife.

Some of the items on her desk include a brush that was presumably used for shaving, washing or powdering, a wooden comb and a wreath-shaped object made of fine, spirally wound wire. »It's a burial crown,« says Ivonne Przemuß. Such crowns were originally placed on the heads of those who died unmarried in the modern age, so mainly boys and girls who died before coming of age. The crown symbolized their marriage with death. For the restorer, it means a great deal of work! If possible, the metal surface is cleaned with a brush, scalpel and tweezers. Ivonne Przemuß works with a microscope—the fragile pieces demand a high level of concentration. As most of the objects are made from a mixture of materials (metals and organic matter), they have to be well documented and filed, and each material has to be identified. The burial objects feature a seemingly endless range of crafted elements, including gold-coated silver wire and silver-coated copper wire that was shaped into beautiful flowers and leaves, or even real flowers and glass beads. The aim is to precisely document the pieces and, if possible, to conserve them, says Ivonne Przemuß.

One of the most striking items on her desk is a metal object that looks like an oversized piece of jewellery. This curious find, known as a »fonticulus disc«, is mounted on a leather strap. Ivonne Przemuß explains that it was attached to parts of the body such as the upper arm. It was found in the grave belonging to Johann Arnold Friderici, a physician who died in 1672 and had been the rector of the university two years previously. »An incision was made in the body and an object was usually inserted to keep the wound open. The wound was then covered with such a disc and bad fluids were caught by the compress underneath, which has also been recovered«. This patently paradoxical procedure can be explained by the medieval doctrine of four humours, according to which there were four bodily fluids that had to remain in constant equilibrium. If this equilibrium was ever disturbed, bad fluids had to be removed from the body in procedures such as bloodletting. The fonticulus disc discovered in Friderici's grave shows that the physician was by no means a poor man—the ancient medical device is made of silver. Indeed, poverty shouldn't have been an issue for professors in the early modern period. »The magnificent garments recovered from the graves show that the professors were buried in municipal costumes,« states Kim Siebenhüner, Professor of Early Modern History. She points out that their clothing was a status symbol. However, the only material to survive is of animal origin, such as the elaborately embroidered doublet made of precious silk that was found in Friderici's grave. She explains that historians could help to interpret and classify those finds. »One such question is how the deceased moved from this world to the next,« says Kim Siebenhüner. The professors could have easily been buried in their cap and gown. The Kollegienhof project is also shedding light on further finds, such as the crucifixes recovered from the grounds of the former students' hostel. What purpose might they have served at a Protestant university? Were they perhaps a sign of the continuity of old orthodox practices? Or are they artefacts from the Dominican monastery that used to occupy the grounds?

Valuable garments are preserved

But let's get back to Professor Friderici's doublet. The valuable garment is being processed by Friederike Leibe. The textile restorer works for the State Office for Monument Preservation and Archaeology of Saxony-Anhalt in Halle (Saale). Her weapon of choice is a micro suction device, a pump to which three laboratory glasses are connected. »The textiles recovered from the graves are covered

The forensic expert restructures the dead man's face (above) piece by piece: The facial features are modelled with layers of plasticine (centre). The resulting sculpture (below) shows Ortolph Fomann the Younger. · Photos: Ivonne Przemuß (above), Constanze Niess (centre and below)

with mould, insect remains and other dirt,« says Friederike Leibe. The aim of her work is to clean and unfold the garments to prepare them for scientific processing. Another aspect of her work revolves around long-term preservation. In this regard, the doublet is in surprisingly good condition—other finds consist of fabric snippets the size of postage stamps and many disintegrate as soon as they are picked up. The doublet was a highly fashionable item of clothing at the time, says Friederike Leibe. The silk probably came from Italy or France and may have been traded at the fair in Leipzig. The restorer has spent a whole 43 days working on the doublet—and her investigations are far from over. For example, the silk velvet may have been dyed with a strong brown dyestuff, but this will have to be confirmed by further detailed analysis. The doublet's striking selvedges may indicate the area in which the velvet was made. The long list of questions raised by the professor's doublet are far from answered.

The skulls are given their old face again

Let's head over to the Institute of Forensic Medicine at the Goethe University Hospital in Frankfurt am Main, where Dr Constanze Niess remodels the faces of the deceased. Facial reconstruction is required whenever human remains are found and the investigating authorities are unable to identify the person. The human skull serves as the basis. »Just like human faces, the proportions of the skull vary considerably from person to person,« says Constanze Niess.

In order to reconstruct the face that once belonged to a skull, Constanze Niess first inserts glass eyes into the eye sockets and then remodels the face layer by layer. She does this using an oil-based modelling clay known as »plasticine«. The advantage of this material is that is doesn't dry out or tear, but this makes it rather sensitive. The soft tissue is between 0.5 and 1.5 cm thick, but pinpoint accuracy isn't absolutely essential, says Constanze Niess. »It's mainly about modelling the person's characteristic features,« explains the forensic specialist. When pictures of the reconstruction are subsequently released to the public, there is a chance that somebody will recognize the dead person, such as former colleagues, classmates or neighbours.

This method was developed by Mikhail Gerasimov (1907–1970), a Russian anthropologist and sculptor who reconstructed the facial features of historical personalities such as Ivan the Terrible and Friedrich Schiller. His method has since been refined by forensic scientists in the USA and there are now around 100 facial reconstruction experts around the world. Constanze Niess has already reconstructed the countenance of numerous historical personalities, most recently the face of Ortolph Fomann the Younger. The professor of history and poetry died in Jena on 6 June 1640 and was buried in the Kollegienkirche. His face was not modelled on the original skull; instead, Dr Alexander Stößel from the Max Planck Institute for the Science of Human History created a 3D model of the skull that had previously been obtained using a CT scan. His colleagues, Dr Alexander Herbig and Dr Wolfgang Haak, provided information on the professor's health, eye colour and hair colour, which they had obtained from DNA samples from one of his teeth. If DNA from the Yersinia pestis bacterium is found in a sample, for instance, it is almost certain that the person concerned died as a result of the plague.

Constanze Niess describes her work on Ortolph Fomann as a »great challenge«. After all, she only had a model of the skull to work with. The model was missing parts from the side of the face and the entire neurocranium. But she is pleased to have been able to give the professor his face back. Her reconstruction resembles the portrait of Fomann during his tenure as a professor at the »Salana« university. She is quick to point out that his nose is narrower in the portrait. However, this may well be due to the painter's artistic freedom.

This is where the written sources on Jena's university history of the 16th and 17th centuries come into play, which are

Gina Grond is pictured here with a sculpture called »Putto mit Totenschädel« (»Putto with Skull«). The restorer is preserving parts of the epitaph for Ortolph Fomann the Elder. Like his son, Ortolph Fomann the Younger, he was a professor at the University of Jena (between 1595 and 1626) and was buried in the Kollegienhof. · Photo: Jens Meyer

kept in the University Archives. They document the academic and scientific work of Fomann and other professors in the early modern period, who are now brought to life through facial reconstruction and portraits. Further information is provided by the records archived at the Thuringian State and University Library. This combination of basic archival sources and archaeological findings, scientific and medical examinations, restorations and presentations is exactly what this special project offers, says PD Dr Stefan Gerber, who is in charge of the University Archives. The project was initiated by his predecessor, Prof. Dr Joachim Bauer, who led the research into the »Collegium Jenense« for many years.

Ortolph Fomann the Younger now has a face again. But we are far from finding answers to all the questions we have for the professor and his contemporaries buried on the Kollegienhof grounds. As the project continues, more exciting findings are waiting on the horizon. A documentary series on the project is being produced for the regional broadcaster, MDR, with funding from the Thuringian State Chancellery. The first part will soon be available on the website made for the Kollegienhof project. One thing is certain: When the project is over, the bones will be returned to their original resting place. ■

Information about the project

In 2018, an interdisciplinary team of experts launched a project entitled »Jena's Early University History based on the Collegium Jenense Grounds with a Special Focus on the Rectors' Graves«. The aim is to present the unique ensemble around the former monastery grounds (»Kollegienhof«) in all its facets and to make it accessible to visitors—in both an analogue and digital setting. The project was initiated by Prof. Dr Joachim Bauer, who spent many years in charge of the University Archives, and his successor PD Dr Stefan Gerber. In addition to the three applicants (the University Archives, the Chair of the Archaeology of Prehistory to the Early Middle Ages with Prof. Dr Peter Ettel and the Chair of Early Modern History with Prof. Dr Kim Siebenhüner), the project brings together other university partners such as the Institute of Art History and the University Hospital. Some of the non-university partners include the Max Planck Institute for the Science of Human History, the Max Planck Institute for Evolutionary Anthropology, and the State Office of Monument Preservation and Archaeology of Saxony-Anhalt. The project is largely financed by the Ernst Abbe Foundation in Jena. The project marks a continuation of the research into the history of the University of Jena in the early modern period, which was intensified in 1998 in the run-up to the 450th anniversary of the »Hohe Schule«, which opened in 1548.

Finding comfort and joy in poetry

Dirk von Petersdorff is a poet. Prof. Dr Dirk von Petersdorff is a university teacher. In addition to his seminars and lectures in German Literature, he also offers courses in creative writing. How does he balance his own artistic work and university life? This is the portrait of a multi-faceted man.

BY STEPHAN LAUDIEN

But the white clouds, those shaggy creatures,
reach into the blue, like mighty paws
at the window to a new homeland,
my silver pencil is receiving signals.

Excerpt from »Short Biography« by Dirk von Petersdorff

What signals are being received by his pencil? What inspiration fuels his work? Where does he get his ideas from? Dirk von Petersdorff does not live in a poet's cave, detached from a world that he merely explores in rhyme. The man is very much involved in life as a university professor and father. Of all things, Dirk von Petersdorff teaches German literature, a subject in which he too could become the object of academic interest. After all, the 55-year-old, who has been teaching at the Friedrich Schiller University Jena since 2008, is one of the most famous German poets. He even won the Kleist Prize in 1998 for his works »Wie es weitergeht« and »Zeitlösung«. Dirk von Petersdorff endures the conflictive nature of his situation. »I don't teach contemporary poetry, though, because I'm simply not neutral on that topic,« he says. But he's much less apprehensive in his creative writing course, where his initial scepticism has since given way to fruitful synergies: »The courses are designed to help students work on their linguistic sensitivity—and sometimes they help me too!«

Joint lectureship with Hans Magnus Enzensberger

Dirk von Petersdorff published his first volume of poetry at the age of 26. »Wie es weitergeht« was published in 1992, but he discovered an interest in poetry well before that. Dirk von Petersdorff, who grew up in Kiel, cites his mother's passion for poetry as his first source of inspiration. His work with poetry went down a new path when one of his teachers introduced him to Ingeborg Bachmann, Bertolt Brecht and Hans Magnus Enzensberger. »I didn't understand some of the poems at first, such as those written by Bachmann,« says Dirk von Petersdorff. But that's exactly what awoke his curiosity. He would later meet Hans Magnus Enzensberger in person and even shared the Tübingen poetics lectureship with him in 2013. Dirk von Petersdorff describes his poetry as being »close to life«. He is currently writing about family, children growing up, growing old, loving and dying. For him, it's always about trying to capture special moments and memories, and keeping them alive through poetry. The trick is to translate one's own experiences into exemplary situations: »I try not to gloss over my experiences of pain and suffering, but rather to transform them in such a way that my writing can be a source of comfort«. He draws inspiration from various sources, especially conversations, pictures, songs and observations. »I have lots of wild pieces of paper and a large notebook full of observations and ideas. Some of them are used, while others are discarded«.

The mind roams free in the morning hours

Peace and quiet are essential ingredients for his work, says Dirk von Petersdorff. When everyone else has left the house in the morning, he sits down at the living room table with a sharp pencil and an eraser. In the morning, his head is free and his thoughts can wander. This flow of thoughts is best captured with a pencil; once the words have coagulated and solidified, they are printed on paper and fine-tuned.
When is something deemed successful? Dirk von Petersdorff lets his finished pieces settle and detaches himself from them. He also finds it helpful to »read out loud, quietly«, which Dirk von Petersdorff also advises the students to do in his creative writing course. Although he takes a critical view of his own work, the texts are first read by his wife and three to four friends. The first official critic is currently Martin Hielscher, the editor at the Beck publishing house: »I appreciate every critical piece of advice!« But the same

Poet and university teacher, Dirk von Petersdorff, in the garden of Frommann's estate (see p. 11), where the university's Institute of German Literature is based. · Photo: Jens Meyer

cannot be said for negative reviews, which »really hurt«. Dirk von Petersdorff started his academic career at Kiel University. As the son of two pedagogues, he himself completed his teacher training in German and History before obtaining his doctorate in 1995 with a thesis on »Mystery Speech. On the Self-Image of Romantic Intellectuals«. In retrospect, he thinks it was an »unbelievable, very nice coincidence« that he wrote about Novalis and Jena Romanticism in his thesis. His next stop was Saarland University, where he spent time as an assistant. He taught in Saarbrücken for twelve years, and that is where his children were born. His first were twins, a boy and a girl, who have just finished high school, and then he had a second son. Dirk von Petersdorff has now been teaching in Jena for many years and is still fascinated by Romanticism: »this new form of writing, this expanded view aimed at the infinite«. He believes the new, highly dynamic and emotive language reflects people in motion.

Dirk von Petersdorff isn't keen to list role models for his own work. He would rather talk about his influences, such as the Polish poet Adam Zagajewski, whom he almost met before the coronavirus foiled his plans and Zagajewski passed away in March this year. Dirk von Petersdorff also finds inspiration in music. For example, he listens to Tocotronic and Element of Crime. »I don't see any dividing line between poetry and song«. The best example is Bob Dylan, the singing poet.

The poet is driven by his more modest works

What remains of Dirk von Petersdorff's poetry? The poet seems relaxed. It's no secret that volumes of poetry are never going to top the best-seller lists. The print runs are still rather modest. However, Dirk von Petersdorff does have a successful booklet that was published in 2017: »Wie schreibe ich ein Gedicht? Kreatives Schreiben: Lyrik« [»How Do I Write a Poem? Creative Writing: Poetry«]. This is where he marries his two careers in poetry and university education. The poet says: »I think it's good that you can find editions featuring a poet's most successful works«. There must be quite a few editions on Goethe, but Gottfried Benn only picked out »three to five« of his own poems. For his part, Dirk von Petersdorff likes to sift through his poems and tends to quarrel with his less successful texts instead of taking delight in his successful ones. However, this does not lead to frustration; it drives him to keep receiving signals. This work ethic is reflected by the title of his latest volume of poetry: »Unsere Spiele enden nicht« [»Our Games Don't End«]. ■

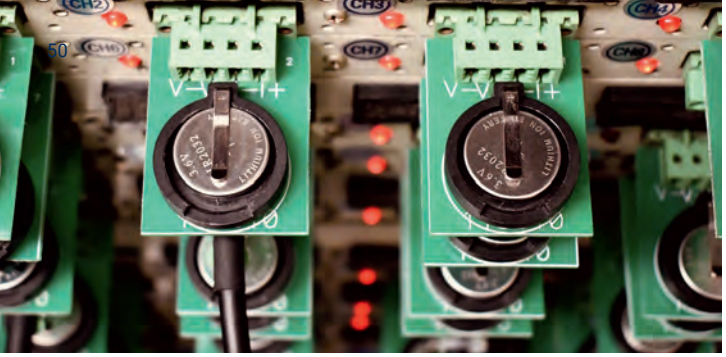


PHOTO: SATHISH RAJENDRAN/WAYNE STATE UNIVERSITY

Lithium metal batteries improved

The energy density of traditional lithium-ion batteries is approaching a saturation point, but lithium-metal batteries can provide much more energy per unit weight. However, their widespread use is currently hindered by the formation of lithium dendrites—small, needle-like structures, similar to stalagmites in a dripstone cave, that grow over the lithium metal anode. Jena scientists led by Prof. Dr Andrey Turchanin, together with colleagues from Boston and Detroit, have now succeeded in preventing dendrite formation and thus at least doubling the lifetime of a lithium metal battery. The researchers reported on their method in the renowned journal »Advanced Energy Materials«. (DOI: 10.1002/aenm.202100666). sh

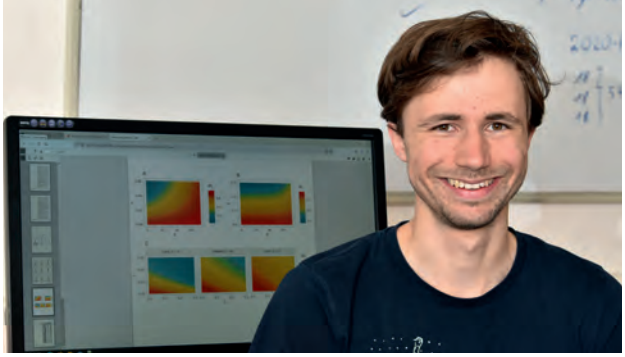


PHOTO: ANNE GÜNTHER

Contagious conspiracy myths

Psychology Master's student Julian Kauk (photo) investigated how conspiracy myths about COVID-19 spread in social networks and published his research results in the scientific journal »PLOS ONE« (DOI: 10.1371/journal.pone.0256179). Using an epidemiological model for calculating the course of infectious diseases, he was able to show that the same mathematical models can describe biological and psychological »courses of infection«. Fact-checking has proven to be an effective means of containing the myth infection. However, this countermeasure loses its power the more widespread the theory has already become. Less successful, but effective regardless of time, is the removal of fake news. viv

PHOTO: AG HOST SEPTOMICS

How microbes invade hospital rooms

A research team from Jena and Berlin led by Prof. Dr Hortense Slevogt studied for more than half a year how bacteria colonize rooms in a new hospital building. On the door handle, in the sink and on the floor, the germs carried into the room by people develop a characteristic spectrum of species. Among them are also pathogens, but their quantity remains relatively constant. In the study published in the journal »Microbiome« (DOI: 10.1186/s40168-021-01109-7), the authors also examined the bacteria present for gene sequences that mediate resistance to antibiotics. While there were only a few positive findings on door handles and in sinks, the resistance genes found on the floor increased over time. Further studies must show the reasons for this and how resistance genes are transmitted. vdG

PHOTO: JENS MEYER

Bacterial toxin blinds algae

Researchers at the University of Jena have discovered a bacterial toxin that destroys the colour pigments in the eyespot of the single-cell green algae *Chlamydomonas reinhardtii*. Together with another toxic substance, the bacteria of the species *Pseudomonas protegen*s not only disorientate and immobilize the green algae, but also condemn them to a certain death. The research team detected the toxin called »protegencin« with the help of Raman spectroscopy and natural product research. They published their study results in the scientific journal »PNAS« (DOI: 10.1073/pnas.2107695118). The researchers led by Prof. Dr Maria Mittag and doctoral candidate Vivien Hotter (photo) found that the green algal culture loses its colour almost completely overnight in the presence of the bacteria (pictured right). At the same time, the toxin dissolves the cell membrane of the algae. US

PHOTO: ANNE GÜNTHER

Efficient frequency doubling

With methods of nonlinear optics, it is possible to double the frequency of a light beam. This makes it possible, for example, to generate laser beams with wavelengths (light colours) that are not available with conventional laser sources. In addition, significant applications lie in the field of photonic data transmission and quantum communication. In order to exploit the potential of this technology, the modulation of the laser must be as fast and efficient as possible. Jena physicists and chemists led by Prof. Giancarlo Soavi (photo) have developed a particularly effective method for this together with colleagues from the Politecnico di Milano. They reported on their success in the scientific journal »Nature Photonics« (DOI: 10.1038/s41566-021-00859-y). sh

PHOTO: MAREN ERTINGSHAUSEN

Microbes united against the enemy

The symbiosis with bacteria protects the fungus *Mortierella verticillata* against its predator—a nematode. The international research team led by Prof. Dr Christian Hertweck found out about this microbial community of purpose by analysing natural substances. They discovered a toxin in the fungus that is also produced in a very similar form by a bacterium. This made the team wonder, because it seemed very unlikely to them that organisms as different as fungi and bacteria would produce such similar natural substances. The researchers published the solution to this riddle in the scientific journal »PNAS« (10.1073/pnas.2110669118): bacteria live in the fungal hyphae and produce the toxin that keeps the nematode away. Monika Kirsch

PHOTO: KAI PAPENFORT/LIANA FRANKE

Small molecules with a dual function

How small RNA and protein molecules regulate the metabolism of cholera bacteria (photo) and the production of cholera toxin is reported by a research team led by Prof. Dr Kai Papenfort in the »EMBO Journal« (DOI: 10.15252/embj.2021108542). The researchers show that a single RNA molecule, called *Vibrio cholerae dual RNA and protein* (vcdRP), intervenes at two distinct levels in the metabolism of the cholera pathogen and thus controls its harmful effect. On the one hand, it inhibits the production of the cholera toxin. Secondly, this small ribonucleic acid itself takes on the role of genetic information and encodes the blueprint for a small regulatory protein. This protein in turn activates a central metabolic pathway that converts dietary carbon into energy and biosynthetic building blocks such as amino acids. US

PHOTO: JENS MEYER

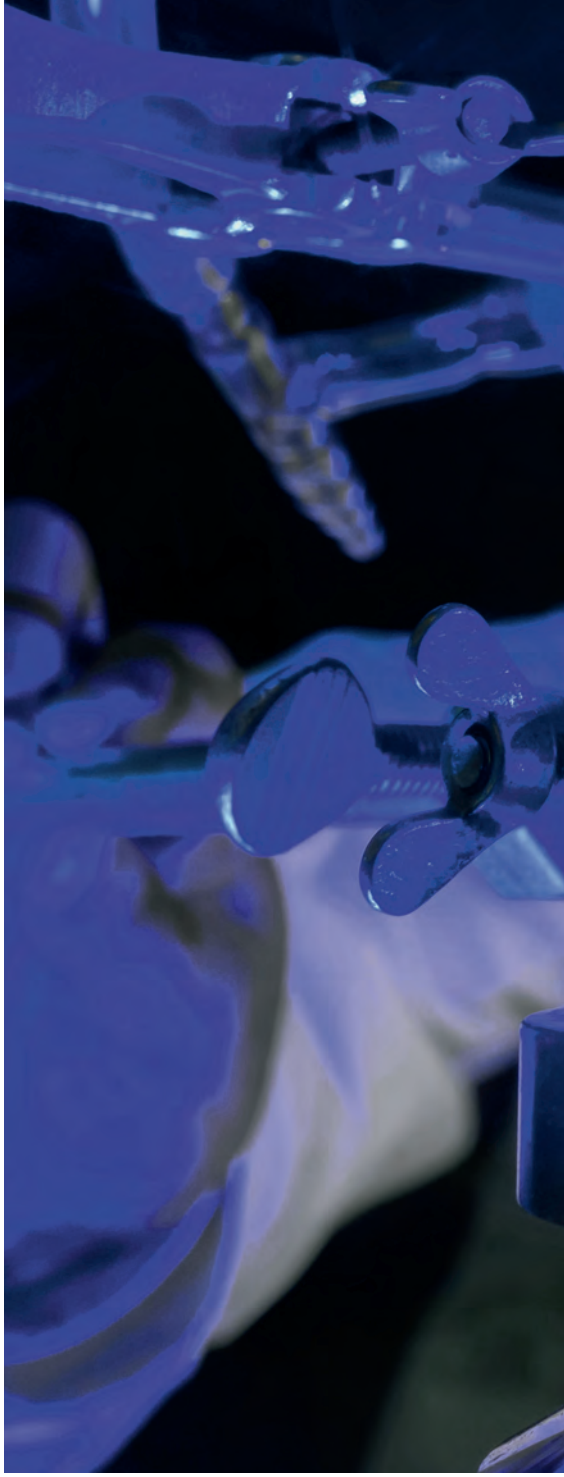
AI detects new natural substances

More than a third of all medicines available today are based on active substances from nature. Such molecules occur in numerous plants, bacteria and fungi. However, making them usable as medicines is time-consuming, costly and labour-intensive. A team of bioinformaticians led by Prof. Dr Sebastian Böcker has now developed a method that enables much faster and easier identification of small active substance molecules. The method presented by the researchers in the journal »Nature Biotechnology« uses machine learning methods to determine the structure of the molecules contained in spectrometric data obtained during the analysis of biological extracts—and does so in a very short time (DOI: 10.1038/s41587-021-01045-9). The researchers expect that thousands of molecular structures can be clarified in this way in the coming years. US

Inspired by nature

The way in which a compound inspired by nature produces hydrogen has now been described in detail for the first time by an international research team from the University of Jena and the University of Milan-Bicocca. These findings are the foundation for the energy-efficient production of hydrogen as a sustainable energy source.

BY MARCO KÖRNER



There are naturally occurring microorganisms that produce hydrogen, using special enzymes called hydrogenases. »What is special about hydrogenases is that they generate hydrogen catalytically. Unlike electrolysis, which is usually carried out industrially using an expensive platinum catalyst, the microorganisms use organometallic iron compounds,« explains Prof. Dr Wolfgang Weigand from the Institute of Inorganic and Analytical Chemistry at the University of Jena in Germany. »As an energy source, hydrogen is naturally of great interest. That's why we want to understand exactly how this catalytic process takes place,« he adds.

In the past, numerous compounds have already been produced worldwide that are chemically modelled on the naturally occurring hydrogenases. In cooperation with the university of Milan, Weigand and his team in Jena have now produced a compound that has yielded entirely new insights into the catalysis process. The group published the results and the proposed reaction pathway in the renowned journal »ACS Catalysis«.

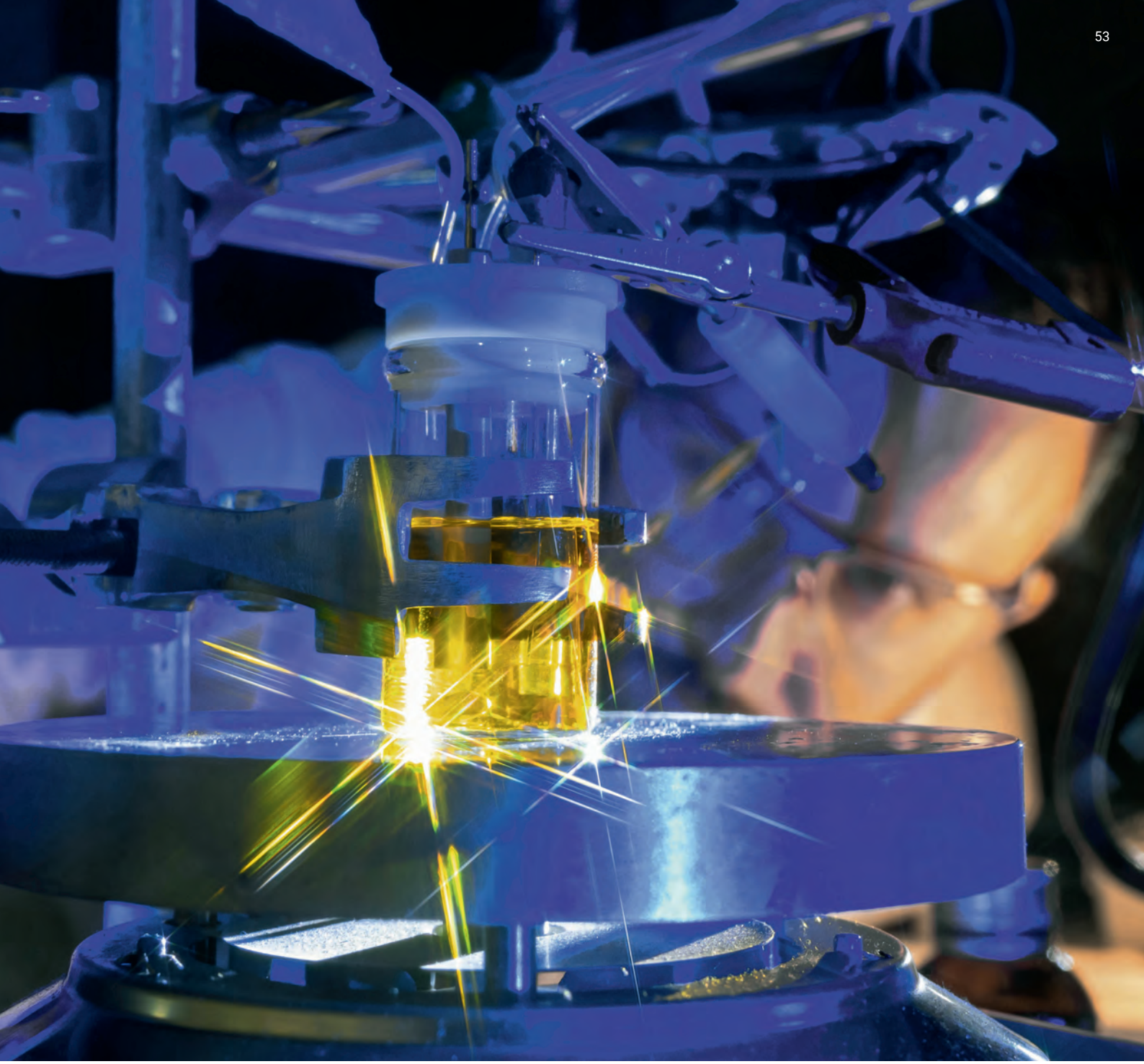
»As in nature, our model is based on a molecule that contains two iron atoms. Compared with the natural form, however, we changed the chemical environment of the iron in a specific way. To be precise, an amine was replaced by a phosphine oxide with similar chemical properties. We therefore brought the element phosphorus into play,« reports Weigand.

Detailed insight into electrocatalytic hydrogen production

This enabled Weigand and his team to better understand the process of hydrogen formation. Water forms positively charged protons and negatively charged hydroxide ions through autodissociation. »Our goal was to understand how these protons form hydrogen. However, the proton donor in our experiments was not water, but an acid,« Weigand says. »We observed that the proton of the acid is transferred to the phosphine oxide of our compound followed by a proton release to one of the iron atoms. A similar process would also be found in the natural variant of the molecule,« he adds. In order to balance the proton's positive charge and ultimately produce hydrogen, negatively charged electrons were introduced in the form of electric current. With the help of cyclic voltammetry and simulation software developed at the University of Jena, the individual steps in which these protons were finally reduced to free hydrogen were examined. »During the experiment, we could actually see how the hydrogen gas rose from the solution in small bubbles,« notes Weigand. »The experimental measurement data from the cyclic voltammetry and the simulation results were then used by the research team in Milan for quantum chemical calculations,« adds Weigand. »This enabled us to propose a plausible mechanism for how the entire reaction proceeds chemically to produce the hydrogen—and this for each individual step of the reaction. This has never been done before with this level of accuracy.«

The goal: hydrogen through solar energy

Building on these findings, Weigand and his team now want to develop new compounds that can not only produce



hydrogen in an energy-efficient way, but also use sustainable energy sources to do so.

The goal of the Transregio Collaborative Research Centre 234 »CataLight«, of which this research is a part, is the production of hydrogen by splitting water with the use of sunlight. »With the knowledge gained from our research, we are now working on designing and investigating new catalysts based on the hydrogenases, which are ultimately activated using light energy,« Weigand says. ■

Dr Laith Almazahreh is investigating the mechanism of electrocatalytic hydrogen formation with a biomimetic model complex of [FeFe] hydrogenase. The electrochemical cell contains a solution of the catalyst used to produce hydrogen. In nature, there are microorganisms that produce hydrogen enzymatically with the help of the [FeFe] hydrogenases. · Photo: Jens Meyer

Original publication:
Proton Shuttle Mediated by $(SCH_2)_2P{=}O$ Moiety in [FeFe]-Hydrogenase Mimics: Electrochemical and DFT Studies, ACS Catalysis (2021), DOI: 10.1021/acscatal.0c05563

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Neuroscientist and head of the study Prof. Dr Gyula Kovács. · Photo: Jens Meyer

Face to face

The human brain remembers faces better after a personal meeting than by looking at photos or videos, according to findings by neuroscientists at Friedrich Schiller University Jena. As their EEG data show, the familiarity of a face is anchored measurably stronger in the brain of the observer if the face is seen in person.

BY UTE SCHÖNFELDER

Recognizing and remembering faces has been essential to the survival of human beings ever since the emergence of our species. As babies, we already recognize familiar individuals and get to know more people throughout our lives. Recognizing our kin, knowing who means us well and who does not—these skills help us in our personal relationships and strengthen the social fabric, today as in the past. An adult will have got to know an average of 5,000 faces and will be able to distinguish them from unknown individuals.

»In spite of intensive research, we still know little about how the neuronal representations develop in the brain when someone becomes familiar to us,« says Prof. Gyula Kovács. To understand these processes better, the neuroscientists Prof. Kovács and Dr. Géza Gergely and their team conducted EEG experiments. For this purpose, they divided participants into three groups. One group was shown photographs of celebrities unknown to the participants. The second group watched a television programme with actors they did not know. The third group talked in person to two members of the lab. The researchers recorded the brain activity of the participants while they were looking at the photos of celebrities, watching the actors on television or interacting with the lab members.

It takes us less than half a second to know whether or not we recognize a face

The EEG studies published in the »Journal of Neuroscience« provided important clues as to how representations in the brain change when we get to know a face. After only about 400 millisec-

Behind the model of a human brain, PhD student Charlotta Eick wears a cap fitted with electrodes to demonstrate the EEG experimental setup. · Photo: Jens Meyer

onds—less than half a second—there is measurable brain activity over the right temporal cortex, a sign that faces are perceived as »familiar«.
However, the extent of familiarity (the amplitude of the signal) depended on the way in which the participants learned the faces. It could be seen particularly strongly after personal contacts, weaker following the television programme, and not measurable after participants had looked at photos.

Familiarity through personal encounter

»When we see a person's face, we often know immediately whether or not we have seen it before,« says Prof. Kovács, explaining the results. »Our experiments show that this feeling of familiarity is imprinted in an especially strong and lasting fashion after personal encounters.« So if we really want to get to know each other, we have to meet in person. ■

Original publication:
Getting to know you: emerging neural representations during face familiarization, Journal of Neuroscience (2021), DOI: 0.1523/JNEUROSCI.2466-20.2021

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Melting the unmeltable

Chemists at the University of Jena have developed a way of melting normally unmeltable metal-organic framework compounds—so-called MOFs. This allows the melt-based production of glass components for applications in energy and environmental technology.

BY SEBASTIAN HOLLSTEIN

Glasses are an indispensable part of everyday life. One of the most important reasons for this is that glass objects can be manufactured almost universally and inexpensively in a wide variety of shapes and sizes using their corresponding melts. Processing in the (viscous) liquid phase offers a versatility that can hardly be achieved with other materials. However, this presupposes that the material from which the glass is made in terms of its chemical composition can be melted at all.

Metal-organic framework compounds—in short MOFs—have attracted a great deal of interest in recent years. Due to their special properties, they are considered to have great potential for future applications in energy and environmental technology, but also as sensor components and in the bio and life sciences. For example, MOFs can be used as starting materials for filter membranes for separating gases in technical combustion processes or for water treatment. The basis for the multitude of possible applications is above all one outstanding property of MOFs: their high and largely controllable porosity. MOF substances consist of inorganic particles that are connected by organic molecules to form a network of pores. As MOFs are predominantly in powder form, a primary challenge of the field is to produce bulk components. This is where glasses come into play.

Trade-off between properties and processability

But apart from a few exceptions, the porosity, of all things, prevents the materials from being meltable and, thus, processable into components of the desired shape. Chemists from the Friedrich Schiller University and the University of Cambridge have now found a solution to this problem. They report on their research results in the journal »Nature Communications«.

PhD student Vahid Nozari uses a microscope to examine the new synthetic glass, which consists of a non-fusible metal-organic framework (MOF) compound. · Photo: Jens Meyer

In order to produce components for industrial applications from MOFs, they can be processed into hybrid glasses, for example. To do this, however, you have to melt them down—a process that is not straightforward in this specific case.

So far, only a handful of candidates of this class of substances have actually been demonstrated to be meltable. »In most known MOF materials, the high porosity is one of the reasons that—upon heating—they thermally decompose before reaching their melting point, that is, they burn,« explains Vahid Nozari, doctoral student at the Laboratory of Glass Science of the University of Jena. It is precisely the property that makes these materials so interesting that also prevents them from being processed using the glass route.

Identifying ideal combinations of ionic liquids, MOF matrices and melting conditions

So how do you make a non-meltable material meltable in order to shape and process it in its liquid state? The team led by Jena professor Lothar Wondraczek has now found an answer to this question. »We filled the pores with an ionic liquid that stabilizes the inner surface in such a way that the substance can finally melt before it even decomposes,« explains Wondraczek. The researchers were able to show how normally non-meltable substances from the MOF family of zeolitic imidazolate frameworks (ZIFs) can actually be converted into a liquid state and, finally, a glass. »In future, the desired component, such as a membrane or disc, could be formed in this way. Residues of the employed ionic liquid can then be washed out after shaping.«

Sample of a metal-organic framework (MOF) compound in glass form. Such components are suitable as starting material for filter membranes that remove carbon dioxide and other hazardous gases during production processes. · Photo: Jens Meyer

The key to future applications are the interactions taking place between the ionic liquid and the MOF material. These determine the reversibility of the process, i.e., the possibility of washing out the auxiliary liquid after the melting process.

If the reactions are not adapted, either the pore surface is not adequately stabilized or there is an irreversible chemical bond between the MOF and parts of the ionic liquid. Therefore, ideal combinations of liquids, matrix materials and melting conditions must be identified with regard to the desired application, so that large-volume objects would become possible. ■

Original publication:
Ionic liquid facilitated melting of the metal-organic framework ZIF-8, Nature Communications,
DOI: 10.1038/s41467-021-25970-0

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The ostrich egg in the PET scanner

A nuclear medicine and chemistry research team is developing new radiodiagnostic tools for imaging in liver diseases using positron emission tomography (PET) and computed tomography (CT). The testing system is extremely unusual.

BY UTA VON DER GÖNNA

In the beginning, there was the egg—but no, this story is not quite so simple. It has at least two starting points. The egg—more precisely, the ostrich egg—only comes into the picture later.

First of all, the story is about patients with liver diseases. In order to examine a patient's liver, we need high-resolution imaging techniques. The most commonly used technique is three-dimensional imaging in MRI (magnetic resonance imaging). Whenever an MRI scan is not possible, for example if a patient has a pacemaker or cannot tolerate contrast media because of kidney disease, the only option is scintigraphy, in which the liver and bile ducts are depicted by means of radiolabelled drugs. However, with the radiolabelled substances currently available, the optical resolution of the images leaves much to be desired. »Above all, exact three-dimensional representation, which is important for assessing organ function or for planning liver surgery, is lacking,« explains Prof. Martin Freesmeyer, head of the Clinic of Nuclear Medicine at Jena University Hospital.

Searching for a new contrast agent

Help is found in an imaging technique that produces high-resolution three-dimensional images: positron emission tomography, or PET for short. In combination with a computed tomography scanner (CT), this method provides exact anatomical resolution and nowadays, the examination is carried out with a hybrid PET/CT scanner. Similar to the contrast agent in radiology, biomarkers coupled with radioactive isotopes (tracers) are used to detect diseases of different kinds. However, no suitable tracers have been established for PET/CT examinations of liver function yet. »The existing liver tracers are not specific enough and are extremely difficult to produce and handle,« says Prof. Freesmeyer. »Therefore, we needed a better radiodiagnostic tool for liver PET/CT.« Together with the research group of Prof. Wolfgang Weigand from

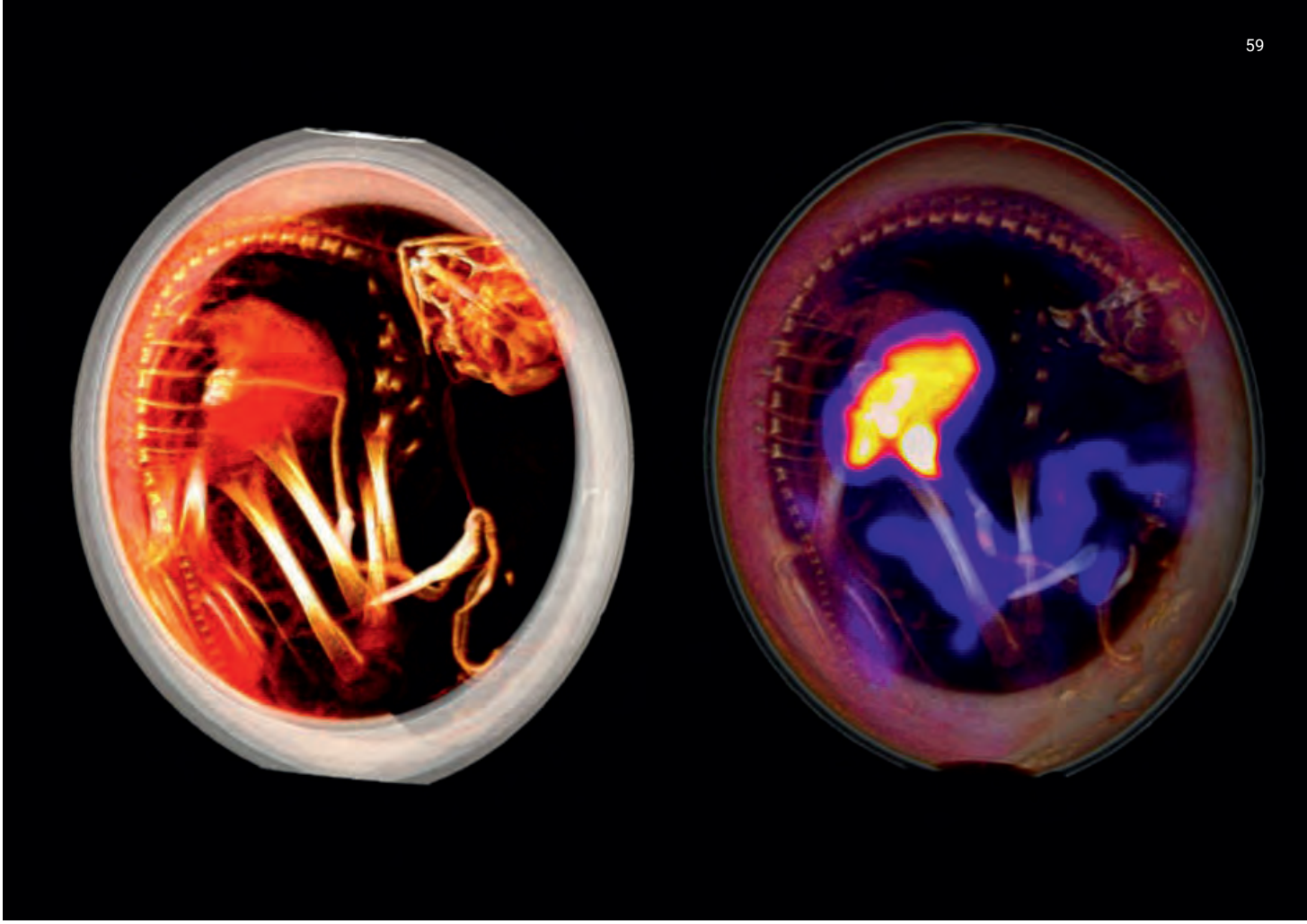

Image top: The newly developed method enables detailed three-dimensional views inside the ostrich egg. Left: the egg in normal CT, right with PET. · Image: Martin Freesmeyer
Photo left: Prof. Martin Freesmeyer examines an ostrich egg in the PET/CT scanner. · Photo: Anna Schroll

the university's Institute of Inorganic and Analytical Chemistry, the research team designed the chemical structure of several liver tracers, then synthesized and chemically characterized them.

Guiding radioactive markers precisely to the liver

The research team chose the radionuclide gallium-68 as the radioactive marker because of its relative ease of use. It can be easily obtained on-site and has a short half-life, which limits the radiation exposure of the tissue. However, the radionuclide alone does not find its way into the liver. It needs to be enveloped by specific binding molecules (»ligands«) that can guide it accurately into the liver. Fat-soluble substances are potential ligands because of their metabolism and excretion via liver cells. A template for the ligand's structure was found in an established contrast agent for the liver, which is routinely used as a non-radioactive substance in MRI examinations. »We equipped the ligands with additional functional groups, so that the gallium ion is sufficiently firmly bound and the substance remains stable under physiological conditions—i.e., in the blood,« says Dr Julia Greiser, describing the procedure. Greiser, a chemist, carried out these syntheses as part of her thesis and is now doing research in the Radiopharmacy Department of the Clinic for Nuclear Medicine. Like a tailor making alterations, Julia Greiser adjusted the ligands until promising candidates for the liver tracer were created.

There was also some luck involved: »The synthesis runs according to a completely new type of reaction and without elaborate reaction conditions, so that good production yields were achieved,« says Julia Greiser. The substance group and its synthesis have been patented by Prof. Freesmeyer and Dr Greiser.

New tracer undergoes testing and inspection procedures

However, before the new PET/CT tracer can be used in the clinic, it has to pass a number of tests and examinations. First, the tracer is tested to establish whether it is actually liver-specific and thus accumulates in the liver tissue after intravenous injection. Up to now, this has mostly been tested in classic animal experiments using rodents.

Apart from ethical aspects, this also has the disadvantage that expensive research equipment is required, specifically small-animal PET/CT systems. These require high investments and expensive premises, and also entail considerable expenditure on space and staff. The research team therefore looked for a solution using the existing imaging systems at the Clinic for Nuclear Medicine. Here, many patient examinations are performed daily on a PET/CT system that is significantly larger than the small-animal PET/CT. »In addition, it is

Dr Thomas Winkens (r.) and medical physicist Christian Kühnel prepare an incubated ostrich egg. Part of the egg shell is removed, so that the radiolabelled tracer substance can be injected via a cannula. · Photo: Anna Schroll

important to us to carry out animal experiments only to the extent really necessary and to replace them with alternatives wherever possible,« emphasizes Prof. Freesmeyer.

Alternative to classic animal experiments

And this is where the other starting point comes into this research story. For decades, incubated hen's eggs have been established in vaccine research, for example, and this is not regarded as a classic animal experiment. Therefore, the scientists transferred the concept of using incubated eggs to imaging and chose the largest eggs available—those of the ostrich. An ostrich egg measures about 15 centimetres in diameter and is large enough for the clinical PET/CT scanner. However, the research team was entering completely new territory when it tackled imaging using the incubated ostrich egg. »After the egg has spent 25 days in the incubator, we mark the vitelline vessels which are made visible by candling through the egg shell. Shortly before the PET/CT examination, after an incubation period of 34 to 37 days, we carefully remove a section of the calcified part of the eggshell without damaging the underlying chorion-allantois membrane with its vessels. We then inject the radiotracer using very thin cannulas, like those used in neonatology,« says nuclear medicine specialist Dr Thomas Winkens, describing the methodology.

The scientists have already obtained impressive images of the bird embryo in this way, as well as proof that the new radiotracer is highly specific to the liver. As part of a project funded by the German Research Foundation, the team will further develop the ostrich egg model in the coming years and establish it as an alternative to classic animal testing.

Preparations for patient applications

Toxicity tests are currently still being carried out in order for the new liver tracer to be used in actual patient care at some point. These tests should not be a problem, as the quantities of molecular radiotracers used are so small that they are in the »subpharmacological« range, meaning that no harmful effect is to be expected, says Prof. Freesmeyer.

The highest possible purity and precision are required in producing the tracers, for which the radioisotope is only generated shortly before the examination and then reacted with the ligands. »We are currently working on implementing the quality guidelines of drug production for the synthesis of the ligands,« explains Julia Greiser. The team is thus meeting important requirements in order to be able to use and test the new tracers on patients soon. ■

Current project:
In-Ovo-Imaging Using Embryonated Eggs of Large Ratite Birds—Evaluation of an Alternative to Classic Animal Research (German Research Foundation)

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PHOTO: ANNE GÜNTHER

Don’t mind the knowledge gap

We do it all the time in our daily lives. But at least since the start of the coronavirus pandemic, it has also become clear to complex societies that we often have to make decisions quickly, even if we do not yet know all the facts needed to assess the possible consequences. However, decisions based on non-knowledge are not bad decisions per se, and not knowing is not fundamentally a flaw, but rather a completely normal aspect of daily life that is sometimes even worthy of protection, according to sociologist Prof. Matthias Groß.

BY MATTHIAS GROß

»Knowledge is power« is a well-known saying. This does not always have to be true, but at least knowledge is seen as an expression of wisdom, diligence, education and progress. In contrast, non-knowledge, that is to say a lack of facts and certainty, is considered a shortcoming—a sign of laziness, stupidity or ignorance.

Knowledge and ignorance are on an equal footing

Sociologically speaking, things look quite different. Knowledge and ignorance are on par with each other. Both can be used as a resource for action, culturally constructed and used for both negative and positive ends. Ignorance can protect, as is shown by the right not to know in medicine. Here, the individual should be protected from receiving information that does not appear useful in order to have a good life. This could refer to the personal risk of contracting a certain disease for which there is no cure or even relief. But it might also be information that could harm self-determination, for example when facts such as sexual orientation are known about a person who wants to keep the information private.

However, ignorance can also be an expression of irresponsible behaviour, such as actively excluding information because it contradicts one’s own world view. Which of these interpretations one chooses depends on one’s own economic interests, social expectations, political attitudes or cultural preferences.

Different forms of ignorance can be distinguished. On the one hand, ignorance can be consciously constructed and information actively withheld, for example to spread doubt, as was done by the tobacco industry in the 1950s regarding the risk of developing cancer through smoking.

On the other hand, ignorance—or »non-knowledge«—can also arise accidentally or unavoidably: new knowledge reveals further, previously unrecognizable, gaps in knowledge, as is the case in virtually every research project. Furthermore, it is analytically important to clarify whether non-knowledge can be converted into knowledge within a specific period of time or whether this is not really to be expected.

If it is clear that non-knowledge, for example about the authenticity of a terror threat, cannot be transformed into knowledge within a certain period of time, then decisions will have to be made under conditions of precisely defined non-knowledge, such as the decision to cancel a football match after an anonymous terror threat.

Finally, there is the fundamental distinction between phenomena that one knows one does not know and things that are completely unknown—what is called unknown non-knowledge. The latter represents an epistemologically different category of non-knowledge and is sociologically accessible only in retrospect, that is, when people or organizations become aware of their previously unrecognized non-knowledge. The coronavirus pandemic has impressively shown that not knowing does not exempt us from making decisions.

To this end, political leaders should disclose and fully communicate the reasons for decisions made in a state of non-knowledge. Transparency about not knowing can help people to understand the situation better, to be patient and to feel empathy.

Precise non-knowledge is often the best one can have

On the scientific side, politicians’ expectations of established facts are still often accommodated and certainties are claimed that do not exist. Instead, we should consider something like non-knowledge communication or even non-knowledge transfer. In many cases, knowing exactly what is not known is the best we can do. This would be beneficial for society, which would gain insight into real-time processes instead of having to settle for the rhetoric of certainty.

It would also make it clearer that non-knowledge is not necessarily at the beginning of a process, but often only arises during that process. Ultimately, resolving non-knowledge through new solutions is usually associated with the generation of new non-knowledge. This is neither new nor bad per se, but a normal aspect of everyday life and almost every decision. ■

New test systems for vaccines

Research team at the University hospital develops models for testing the efficacy of vaccines

The rapid development of COVID-19 vaccines has shown that biomedical and data science innovations can open up new avenues for vaccine development. The »Inno4Vac Alliance«, which has now been launched, aims to accelerate these innovations in a targeted manner. One partner in the network is the »INSPIRE« working group, led by PD Dr Alexander Mosig at the Institute of Biochemistry II of the University Hospital.

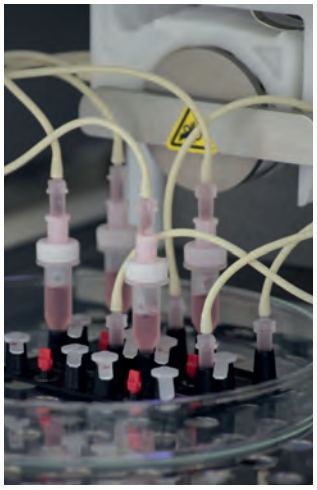

PHOTO: AG INSPIRE

The team uses stem cells to develop physiological models of human organs that reproduce the interaction with immune cells. This should enable predictions of the immune response and vaccine efficacy. The »INSPIRE« working group is funded with about 800,000 euros as part of a public-private partnership with 41 partners from eleven European countries. vdG

Skin model replaces animal testing

Researchers at the University hospital develop a test method for antimicrobial wound healing products

The research laboratory of the Clinic for Skin Diseases of the University hospital is working on practical skin infection models and reproducible procedures with which skin injuries can be simulated. In cooperation with a business partner, the researchers led by PD Dr Cornelia Wiegand are currently developing a standardized test procedure for the effectiveness of antimicrobial wound healing products as an alternative to previous animal testing. The »InVitroWund« cooperation project funded by the Federal Ministry for Economic Affairs and Energy uses a three-dimensional model of human skin that completely replicates the epidermis and dermis and shows central functions of the organ as well as its reactions. The aim is to create an environment in the artificial skin that is as similar as possible to a real wound. vdG

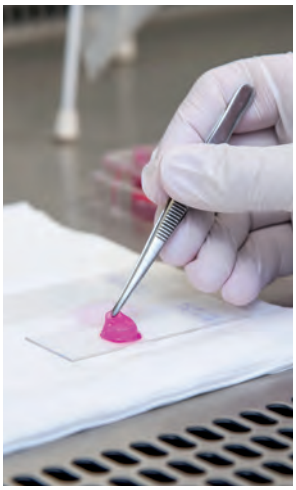

PHOTO: HEIKO HELLMANN

Stress relief

Study investigates whether stroking makes nerve fibres grow

PHOTO: ANNE GÜNTHER

Humans have a special sense with which they can perceive emotion-driven physical contact via C-tactile nerve fibres. But, at what age are these special nerve fibres sufficiently developed to perceive touch? Scientists know that the C-tactile nerve fibres are already functional in newborns. But from which developmental period before the actual birth they are fully mature is unknown so far. Psychologists from the University of Jena led by Prof. Dr Ilona Croy and physicians from Jena and Dresden want to find this out over the next three years together with colleagues in France, Norway and Hungary and thereby possibly develop a method that helps premature babies to reduce stress. The German Aerospace Centre is supporting the project »PreTouch—Tactile-Sensory Impairment of C-LTMR Afferences in Premature Babies and Intervention Approaches« with around 1.1 million euros. sh

Eastern Europe

Historians research illiberal democracies in East Central Europe

PHOTO: ANNE GÜNTHER

In some countries of East Central Europe, governments have established that quite offensively propagate an illiberal version as their own variety of democracy and change the respective states accordingly—above all Poland and Hungary. Together with colleagues from Erfurt, Budapest and Warsaw, as well as from the Czech Academy of Sciences in Prague, Eastern European experts led by Prof. Dr Joachim von Puttkamer (photo) want to explore what understanding of the constitution underlies this development, what lines of tradition it builds on and what it means for the rest of Europe. The Volkswagen Foundation is supporting the international project »Towards Illiberal Constitutionalism in East Central Europe: Historical Analysis in Comparative and Transnational Perspectives« within the framework of its funding programme »Challenges for Europe« with almost 1.5 million euros over the next four years. sh

The virtual classroom

Educational study on the use of VR headsets in teacher training

Digital learning has received a lot of attention during the coronavirus pandemic. Jena educational scientist Prof. Dr Alexander Gröschner is picking up this thread in a new research project. Together with colleagues from Finland, Israel, Turkey and the USA, he is investigating in the first transnational study on this subject how virtual reality can enrich teacher training—and thus also enhance teaching in schools. The researchers are supported by the European Association for Research on Learning and Instruction (EARLI) and the Jacobs Foundation. For the study, participants enter simulated classrooms using VR headsets and can try out different forms of teaching and content. Meanwhile the researchers observe their movements and reactions. Afterwards, the participants record their experiences. sh

PHOTO: JENS MEYER

Digital chemistry studies

New project aims to deepen advantages of digital teaching in chemistry studies

Hybrid teaching formats have increasingly found their way into everyday teaching in recent years. The University of Jena does not want to do without their advantages even after the pandemic and actually wants to develop them further. The project »Automatic synthesis and online monitoring of reactions in the chemical practical course using cloud applications«, which is led by the chemists Prof. Dr Timm Wilke and Prof. Dr Ulrich S. Schubert, is now being supported by the Chemical Industry Fund for one year with 25,000 euros. The project will expand the practical laboratory synthesis courses. Specifically, reactions will be automated in a synthesis robot and monitored online with the LabPi measuring system. The obtained data will then be transferred to an associated cloud whose software enables an evaluation. AB

PHOTO: JAN-PETER KASPER

Innovation

Project launch on innovations with European alliance

PHOTO: ANNA SCHROLL

Together with its partners in the EC2U university alliance, the University of Jena was able to successfully acquire the project »Research and Innovation for Cities and Citizens« (RI4C2), funded by the EU with around two million euros. The project seeks to promote a pan-European knowledge ecosystem and provide impetus for research and innovation in the universities and cities. The aim is to position the EC2U network as a pioneer and driver of innovation. The University of Jena is primarily responsible for the topic of innovation. The EC2U consortium consists of seven universities that have education and research as common guidelines: the University of Coimbra, the University Alexandru Ioan Cuza in Iaşi, the University of Jena, the University of Pavia, the University of Poitiers, the University of Salamanca and the University of Turku. Strauss/Hillinger

South Caucasus

Researchers analyse foreign policy of the European Union

PHOTO: JENS MEYER

For decades, the European Union's foreign policy aimed at institutionalization and transformation, through which it directly sought to solve problems and conflicts in its neighbouring regions. However, this approach was not as successful as hoped. Therefore, the EU changed course in 2016 and is now trying to make individual states more robust from within and strengthen their resilience. A team from the Institute for Slavic and Caucasian Studies at the University of Jena is analysing the impact of the new strategy on the states of the South Caucasus in a project. The Federal Ministry of Education and Research is funding the project »Resilience in the South Caucasus: prospects and challenges of a new EU foreign policy concept«, in which doctoral students Veronika Pfeilschifter (l.) and Irena Gonashvili are participating, with around 900,000 euros over the next three years. sh

Bernhard Bock inspects the preserved brain of a primate before putting it into the moving box. · Photo: Jens Meyer

Pictures right (top to bottom): All of the approximately 10,000 glasses are packed into special hazardous goods transport boxes and transferred to the collection's new home at Carl-Pulfrich-Strasse.

Fetus of a Comorian coelacanth (*Latimeria chalumnae*), preserved from a female caught on the coast of Mozambique in 1991. The animal is a gift from the biologist and animal filmmaker Prof. Hans W. Fricke, who, among other things, took the first live photographs of the coelacanth.

Before the glasses are placed into the boxes, taxidermists Matthias Krüger (r.) and Bernhard Bock sort the pieces so that everything finds its place after being unpacked.

Just arrived: The new racks are being filled. Here the valuable historical exhibits can be safely stored for future generations of researchers. · Photos: Jens Meyer

Glass database

A new home for coelacanth, viperfish and goliath frog—the Phyletic Museum's wet collection of more than 40,000 historical exhibits has been relocated.

BY AXEL BURCHARDT

Alcohol can be a very important tool in science—the Phyletic Museum's wet collection wouldn't exist without it. Since 1850, around 40,000 animals have been kept in an alcohol solution in around 10,000 glass containers to preserve them for science. Around one third of the animals are kept in formalin. Unlike in exhibition collections, the exhibits in the wet collections are not processed before being preserved. They are not intended for public display, but for scientific use.

Research using state-of-the-art technology on historical specimen

On the one hand, the animals collected and dated exclusively by experts around the world can be used to identify evolution in species and populations—for example, a bird caught in the present day can be compared with its ancestor if it comes from the same location. On the other hand, the wet collection enables research to be carried out on historical specimens using state-of-the-art technology, which provides answers to questions that haven't even come up in science before. As the preserved animals still contain all their information, they can be examined using new methods in genetics, imaging and other fields.

Unlike in the museum's insect collection, for example, where the exhibits are dried and their organs are not preserved (and valuable information is therefore lost), the animals in the wet collection have all their organs and genes intact. As a result, gene analysis and other methods can be used to identify relationships over the centuries. The wet collection forms a glass database with selected historical exhibits for current and future research—even if the exhibits have only just started to be digitalized.

And in keeping with a database, the wet collection needed an »update« in 2021. The exhibits had to be moved from the Phyletic Museum to a more suitable location to allow researchers to work as safely and effectively as possible. The animals are now being kept in optimal conditions and the researchers have more space for their investigations. After around four years of planning, it took less than four weeks to settle the glass database in its new home in summer 2021.

The relocation didn't cause any damage, but it did generate lots of new knowledge, as the experts already started noticing a few things during their preparation that were not previously included in the long lists of data on the exhibits—research projects for future generations. However, there was one thing the taxidermists had to do after the relocation: top up the alcohol level in some of the glasses. ■


PHYLETISCHES MUSEUM
MUSEUM
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Fetus of a humpback whale (*Megaptera novaeangliae*). The animal originates from the Antarctic and was caught during a whaling expedition. · Photo: Jens Meyer

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