

# Off the BENCH

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22

The Eppendorf – LifeScienceStyle Magazine

## NATURE AS AN INSPIRATION

Lightweight construction, soft  
materials, high efficiency:  
robots are anything  
but mechanical

## HUMAN-MADE

The Anthropocene marks a  
new geological era. It  
obliges us to protect  
our planet



# Dossier In Mental Balance

presented by  
**eppendorf**



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i **Dear Reader,**

Are we psychologically healthy? Or, to ask a slightly different question, when does one suffer from actual mental illness rather than feeling just a little off? Finding the answer definitely takes a certain amount of critical introspection. In any case, the increasing sensitization to this topic does us all good. After all, sweeping a topic that concerns us all under the rug would be quite anachronistic.



Eppendorf takes the wellbeing of its employees, customers and suppliers very seriously, and we advocate for well-being at a number of different levels. Moreover, we want to contribute to the increasing discourse about mental health – and simultaneously break down prejudice.

As our main topic of this issue of “Off the Bench” shows: prejudice remains. Stigmatization of mental health problems is on the rise, and the psychological care of those affected is subject to huge differences across the globe. Independent of other factors, studies show that it is mainly young people and women who increasingly suffer from depression. Read our dossier and find out how strengthening resilience can help – and what everyone can do on a daily basis to maintain good mental health.

It is my pleasure to take this opportunity to introduce an additional publication from our company: the first Eppendorf sustainability report has been released, for the year 2021. Our contribution on pages 28 and 29 offers a good initial overview of the leading topics on which we focus therein. By the way, in line with our sustainability strategy, effective immediately, we will be printing “Off the Bench”, as well as all other printed products, on one hundred percent recycled paper. Not only our long-standing readers will notice: this feels good!

We hope you will enjoy the read,

**Eva van Pelt**  
Co-CEO

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# Knowledge Appetizers

**Goal achieved**  
The human genome has been decoded several times – now the genetic blueprint is actually available without gaps

## This Time for Real!

In 2001, the Human Genome Project celebrated the first-ever decoding of the human genome. A milestone for genetics, even if eight percent of the DNA sequence was still missing. In 2003, more good news followed: the human genome had now been sequenced in its entirety. Now, 21 years later, we are absolutely certain: the complete human DNA code is seamlessly sequenced! Really?

Using the latest sequencing technologies, the international consortium T2T, which had taken on the task of deciphering the remainder of the human genome,

focused its research on the repetitive genes and variants – a focus which, due to its complexity, had thus far not been accessible to past research. Success: a reference genome is now available that shows the entire DNA sequence of the human genome – including the hitherto missing eight percent.

Having access to the blueprint of life allows for hope to blossom: the chance is real that the genetic basis of many diseases which are rooted in gene defects will now be better understood.



## No Goal, Many Ideas

Exercise is good for you – nothing new here – but the discovery that exercise can also boost creativity is big news. Jogging, however, does not do the trick. Instead, researchers at the University of Würzburg learned that it is crucial that one wander aimlessly. Those who simply set out with “the path as their goal” may more readily stimulate their divergent thinking abilities than someone who walks along a defined route. Meandering is thus more amenable to the generation of entirely new ideas outside of the solutions at hand. The same is also true for sitting: those who loll around on a chair may just come up with better ideas than those who stare at their screens.



## Electricity from Solar Glass

A team of scientists at Michigan State University has developed a transparent solar glass. This novel technology utilizes organic molecules for the purpose of absorbing invisible wavelengths of sunlight. The researchers were able to calibrate these materials to ultraviolet and near infrared wavelengths which will ultimately be converted into electricity. According to relevant publications, up to seven billion square meters of glass surface – including windows and auto glass – within the US could be covered with this material. The output would be substantial: 40 percent of the energy demand of the United States could thus be satisfied in a climate-friendly manner.



# 22

million dollars – this is the amount that the US Department of Defense has recently spent on the study of ghosts. The goal was to investigate the legend of “Skinwalker Ranch”. UFOs, werewolves, poltergeists, light apparitions – what is behind the mysterious goings-on at this Utah ranch? These bizarre events are now laid out in detail in the book “Skinwalkers at the Pentagon”.

## Creature Comforts

Those who follow a vegan diet are known to be invested in the well-being of animals overall. The pharmaceutical company Axunio is now offering the first painkiller worldwide which carries the international Vegan Trademark. “Paravegano” contains 500 milligrams of acetaminophen (also known as paracetamol), and it is manufactured entirely without animal testing or animal-based additives. Crucially, the ingredient stearic acid, which, in conventional analgesics, is often derived from animal sources, has been replaced with magnesium stearate, which is obtained from plants. The only downside: at this time, this OTC medication is only available in Germany.



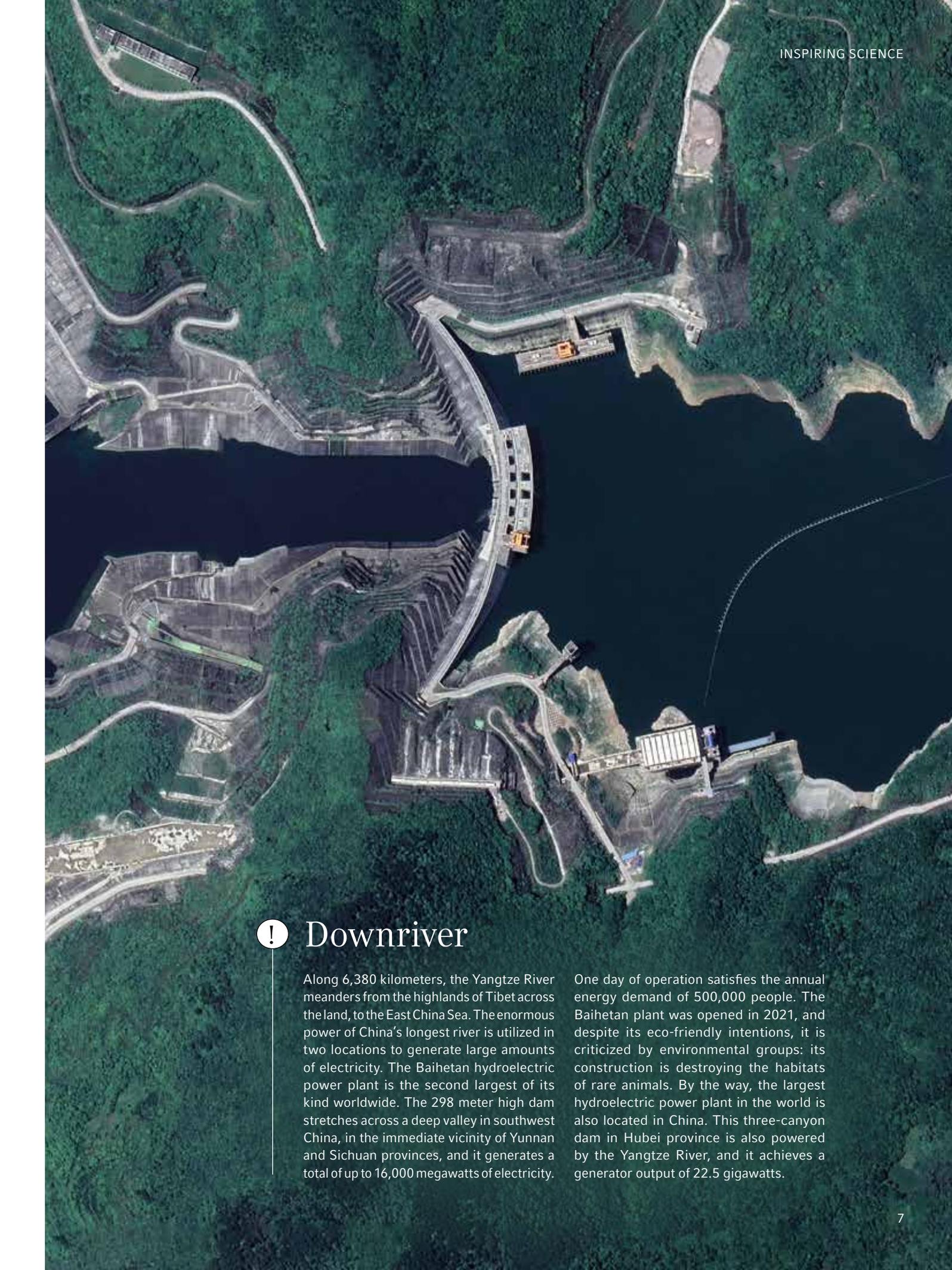
# The Pillars of Energy Transition

Thanks to Research and Development, renewable energy is being generated in ever more efficient facilities – in India, China and Scotland, as well as amidst the romantic scenery of Tuscany.



## ! Floating for Energy

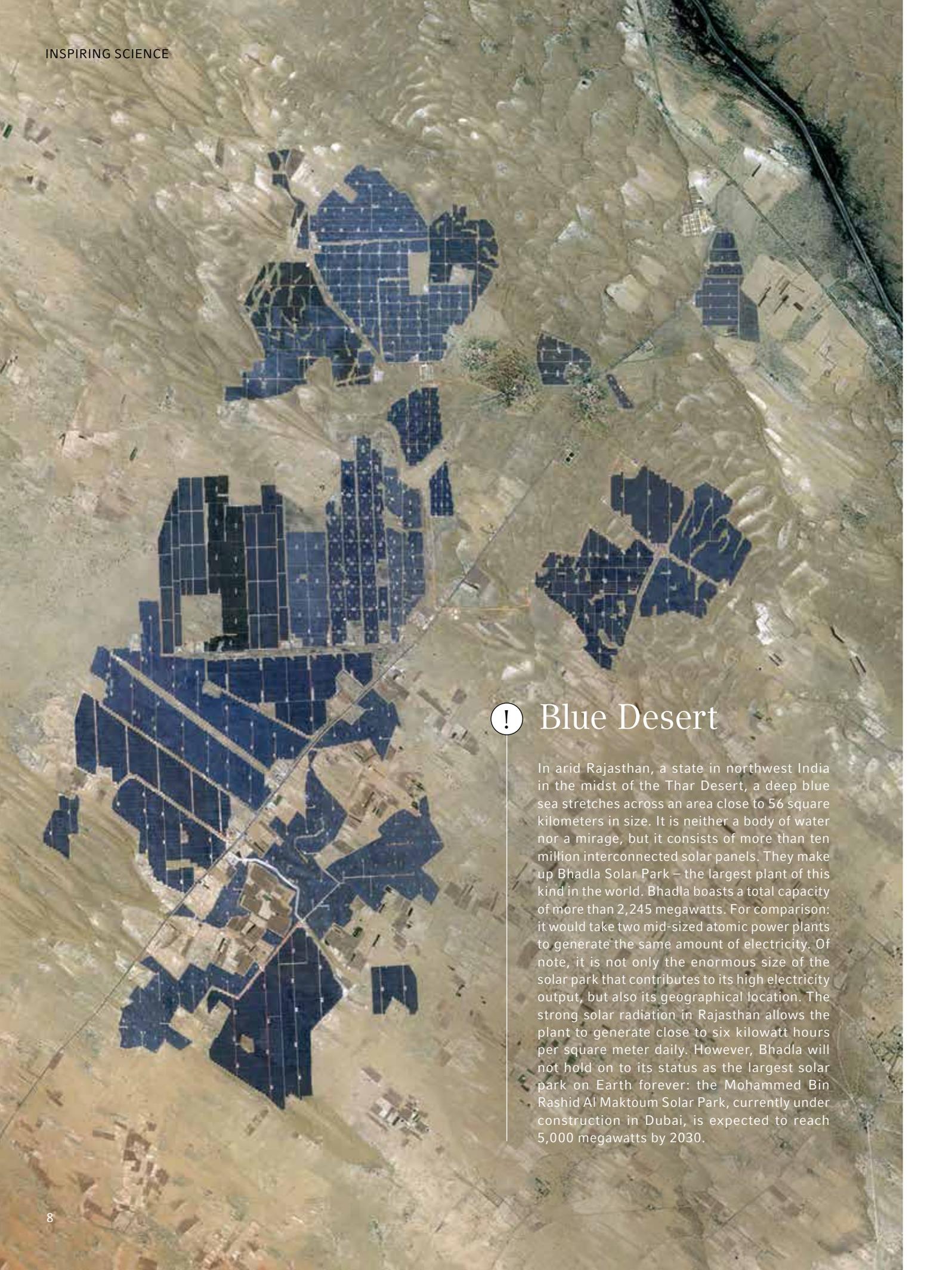
15 kilometers off the coast of Aberdeenshire in Scotland, six gigantic wind turbines tower above the ocean. The 50 megawatt Kincardine wind park is the largest floating offshore wind park in the world. Every year, this plant generates 200 million kilowatts of electricity – enough to supply up to 35,000 Scottish households with energy. Unlike traditional offshore facilities, Kincardine is not securely anchored to the ocean floor as the ocean depth of 80 meters exceeds the maximum depth of 60 meters for firmly installed plants. The wind park was instead installed on semi-submersible WindFloat platforms and is now delivering its energy while afloat. A clever solution that is gathering considerable steam in order to harness hitherto inaccessible areas of ocean. However, these smart counterparts cannot compete with permanently installed wind farms: the currently largest offshore wind park in the world is Hornsea One. Located off the East Coast of England, it generates a total of 1,218 megawatts.



## ! Downriver

Along 6,380 kilometers, the Yangtze River meanders from the highlands of Tibet across the land, to the East China Sea. The enormous power of China's longest river is utilized in two locations to generate large amounts of electricity. The Baihetan hydroelectric power plant is the second largest of its kind worldwide. The 298 meter high dam stretches across a deep valley in southwest China, in the immediate vicinity of Yunnan and Sichuan provinces, and it generates a total of up to 16,000 megawatts of electricity.

One day of operation satisfies the annual energy demand of 500,000 people. The Baihetan plant was opened in 2021, and despite its eco-friendly intentions, it is criticized by environmental groups: its construction is destroying the habitats of rare animals. By the way, the largest hydroelectric power plant in the world is also located in China. This three-canyon dam in Hubei province is also powered by the Yangtze River, and it achieves a generator output of 22.5 gigawatts.



## ! Blue Desert

In arid Rajasthan, a state in northwest India in the midst of the Thar Desert, a deep blue sea stretches across an area close to 56 square kilometers in size. It is neither a body of water nor a mirage, but it consists of more than ten million interconnected solar panels. They make up Bhadla Solar Park – the largest plant of this kind in the world. Bhadla boasts a total capacity of more than 2,245 megawatts. For comparison: it would take two mid-sized atomic power plants to generate the same amount of electricity. Of note, it is not only the enormous size of the solar park that contributes to its high electricity output, but also its geographical location. The strong solar radiation in Rajasthan allows the plant to generate close to six kilowatt hours per square meter daily. However, Bhadla will not hold on to its status as the largest solar park on Earth forever: the Mohammed Bin Rashid Al Maktoum Solar Park, currently under construction in Dubai, is expected to reach 5,000 megawatts by 2030.

## ! Italian Temperament

Tuscany – a place of longing for many, with its gentle hills, charming villages and rich collections of Renaissance art. In comparison, one treasure of the region appears much less romantic: Larderello, a village of 850 people located 70 kilometers south of Pisa, is home to the world's oldest geothermal complex. This is where, in 1901, the aristocrat Prince Piero Ginori Conti initiated the construction of an experimental facility which today comprises 34 power plants. This worldwide second largest geothermal plant obtains its energy from

subterranean geothermal reserves, some more than four kilometers deep. The electricity is sufficient for two million households – one quarter of the total demand of Tuscany. Geothermal energy is a source of green electricity capable of providing baseload power. Meaning: in contrast to other sources of electricity, it is not dependent on weather patterns and is thus able to produce energy on a continuous basis. The world's largest geothermal field is located in California. The Geysers achieves a total of up to 1,520 megawatts.





# Fatal Attraction

Spiders are not particularly popular. Could this be because not a lot is known about them? Behavioral scientist Jutta Schneider would like to change that. The focus of her research: the sex life of the wasp spider.

**V**ery few people would consider the laboratory of Jutta Schneider a cozy place to be, with its tropical temperatures, high humidity and countless spiderwebs. A horror show for some – everyday work for Schneider. Where others shy away, she takes a closer look: how do the creatures spin their webs? How do they package their prey? How do they mate? While spiders are not very well liked, they are, in fact, everywhere – from the desert to the jungle, coming all the way into our own living rooms, which from time to time leads to unpleasant encounters. “Disgust and fear can be overcome”, knows Schneider.

From childhood, she has been fascinated by the world of animals. Like her idol, Jane Goodall, she initially wanted to live with chimpanzees in the rain forest of Africa. But then life took a different turn. “The offer to work with spiders came from my PhD advisor. Even though I had no idea what I would be getting myself into, I went ahead and accepted”, she remembers. While she did not find spiders repulsive, she did not find them particularly interesting, either. “This changed when I realized how little science knows about these creatures and how fascinating their behavior can be – for example, that of the wasp spider.”

## Males as a snack

While elaborating on *Argiope bruennichi*, Schneider romanticizes: “Even just their black and yellow coloring is charming, as well as the web with its striking zigzag pattern in the center. They are also incredibly good hunters. How they catch grasshoppers and then wrap them up in a matter of seconds – amazing!” Their mating behavior, too, is fascinating. The reason why the males are eaten by the females during the mating act, for example, puzzled even naturalists Charles Darwin (1809–1882) and Jean-Henri Fabre (1823–1915). But now, the secret of the wasp spider has been lifted – not least thanks to research conducted by Jutta Schneider.

Sexual cannibalism is observed in many spider species. The common belief that this kind of food consumption provides an important source of nutrition, however, is mostly incorrect: “For the females, the small males are nothing more than a snack.” Instead, sexual cannibalism has been found to be a part of a more complex strategy. Schneider’s team discovered that the males are capable of mating only twice in their life – by folding out two sperm-filled pedipalps on their heads and interlocking them with one of the female’s two sexual openings. With each of their two pedipalps, they can fertilize a female once – afterwards, the tip of the pedipalp breaks off and seals the respective opening like a cork. In this way, they ensure that no other male will mate with this female.

Even if the male dies following the first mating act, one half of fatherhood has been secured with this female – even though the males do try very much to escape following the first mating in order to mate with this female a second time. Since the males can use each pedipalp only once, they will have accomplished their life's purpose after two mating acts. Afterwards, they will die without a fight and thus become easy prey for the inseminated female.

#### Monogyny instead of polygyny

Experts know today that this type of sexual cannibalism is not rare among spiders. Schneider: "We are all familiar with the phenomenon of polygyny, meaning that one male can mate with more than one female; however, we had never considered the possibility that there are females who mate with more than one male while these, in turn, can mate only once." This system of monogyny can also be observed in other species – in anglerfish, for

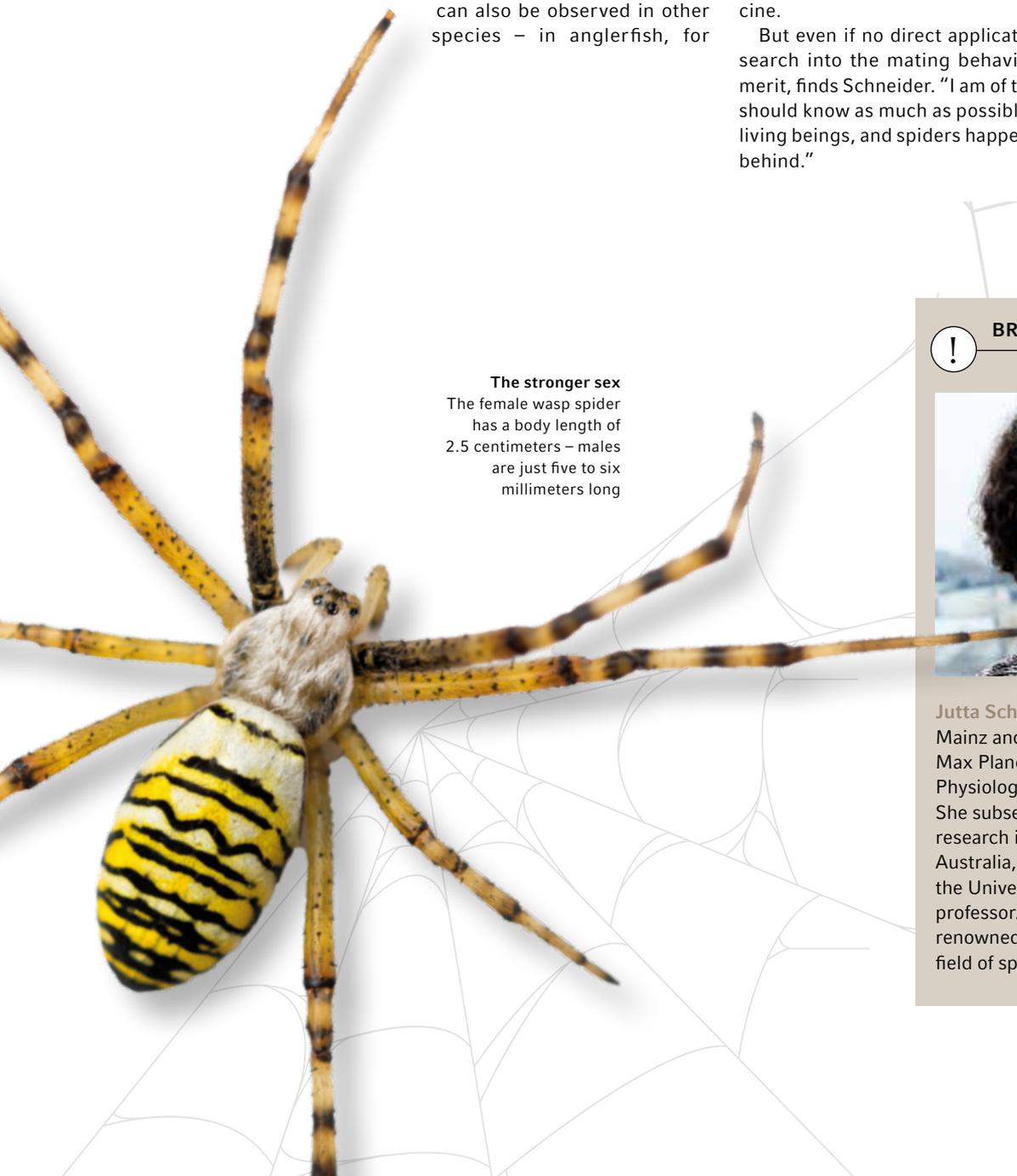
example, as well as other marine organisms. "It is characteristic that within these species, there are more males than females, and that the males are consistently much smaller than their female partners." A discovery of this kind is fortunate for evolutionary biologists as it is an example of convergence. In instances of convergence, a trait has developed multiple times throughout the course of evolution, in different species, and independent of each other.

But how do Schneider and her team study these creatures? "We observe them, we breed them in the laboratory, and we conduct experiments", she says. "We want to better understand evolution and, last but not least, our own history." Moreover, basic research frequently leads to applicable results: spider silk, for example, with its tensile strength and elasticity, is interesting not only to the field of materials science, but it is also employed in medicine.

But even if no direct application is evident, research into the mating behavior of spiders has merit, finds Schneider. "I am of the opinion that we should know as much as possible about our fellow living beings, and spiders happen to be lagging far behind." ■

#### The stronger sex

The female wasp spider has a body length of 2.5 centimeters – males are just five to six millimeters long



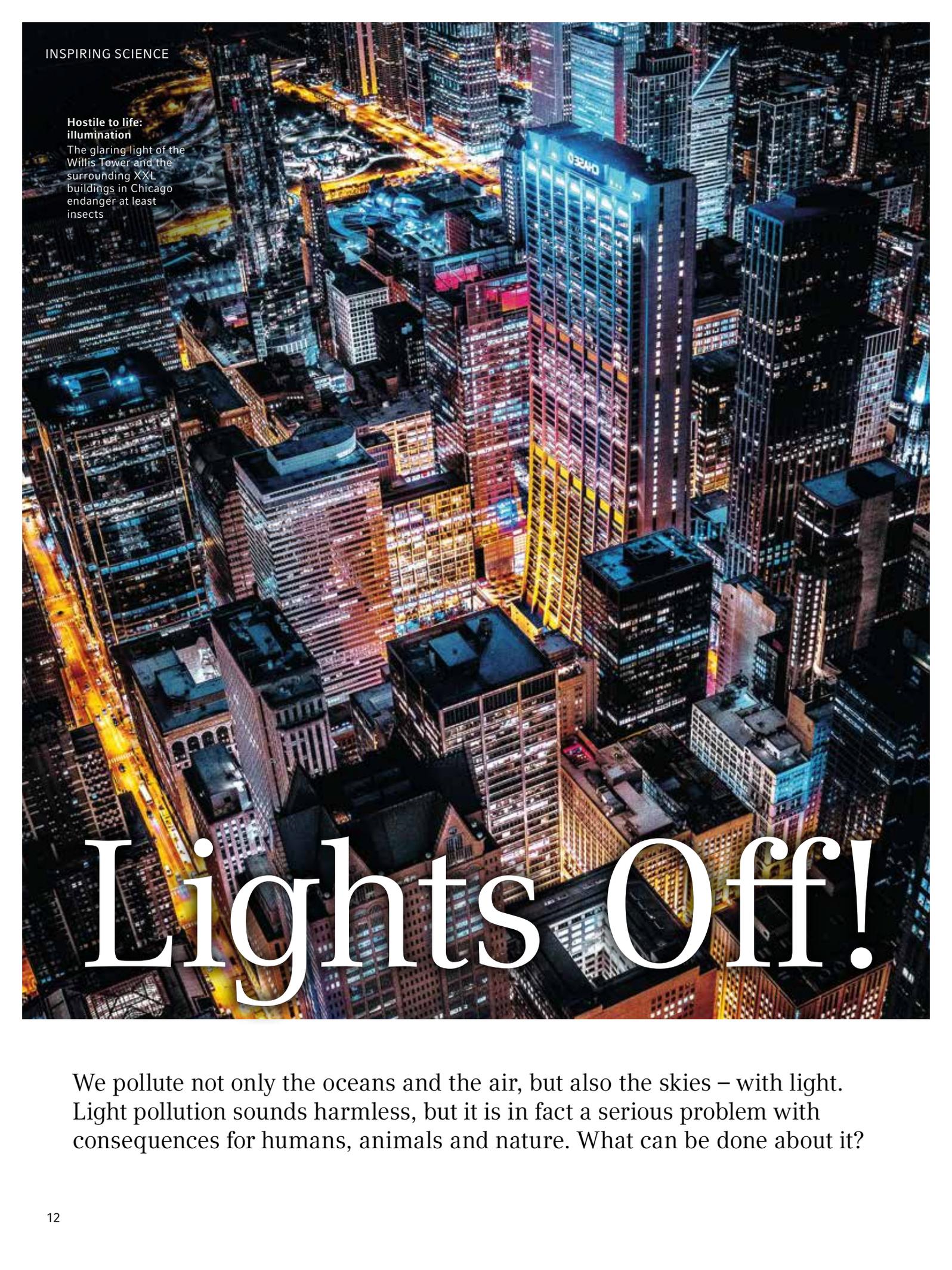
#### BRIEF PORTRAIT



**Jutta Schneider** studied biology in Mainz and completed her PhD at the Max Planck Institute for Behavioral Physiology and the LMU Munich. She subsequently conducted research in Israel, Denmark and Australia, and in 2004, she joined the University of Hamburg as a full professor. Jutta Schneider is a renowned global expert within the field of spider research.

**Hostile to life:  
illumination**

The glaring light of the Willis Tower and the surrounding XXL buildings in Chicago endanger at least insects



# Lights Off!

We pollute not only the oceans and the air, but also the skies – with light. Light pollution sounds harmless, but it is in fact a serious problem with consequences for humans, animals and nature. What can be done about it?



**W**hen Samyukta Manikumar sets out into nature on foot, it is mostly in the dark. She is neither looking for wild animals nor beautiful scenery, but the night sky. “There are very few places where the sky is as clear, and constellations as impressive, as right here”, recounts the 28-year-old from Kenya who, close to Nairobi, can only occasionally spot the Big Dipper or the Milky Way. Apart from that, it is mostly the high beams of cars and streetlights that dominate the views of the sky.

Light pollution is the name for this phenomenon – when artificial light sources outshine the light of the stars and the moon. “Those who want to enjoy an undisturbed view of the stars must leave civilization behind”, advises Manikumar. As a tour guide, she takes people with her on her night walks. Together, they lie on the ground and gaze at the shining stars through their binoculars or cameras, or simply with the naked eye. “In the beginning, some can’t stop being amazed as they experience true darkness for the very first time.”

#### **Exposed to light smog**

Neon lights, floodlights and industrial lighting, as well as car lights, generate light domes in the night which brighten the sky within a radius of several kilometers. Even a seemingly clear night sky is affected by light scatter which becomes evident through astrophotography and its extended exposure times. “Whereas in a deep dark environment, the naked eye should be able to detect more than 6,000 stars, it is often only dozens within cities”, says Manikumar. Since most people live in settlements or cities, up to 80 percent of the world population, and 99 percent of those living in Europe, are directly affected by light smog.

Furthermore, multiple studies have been able to demonstrate the negative effects on humans and on nature. For example, the nightly exposure to light influences our hormone balance. The release of the sleep hormone melatonin is delayed, which makes falling asleep in the evening, as well as waking up in the morning, more difficult. Problems sleeping may contribute to the onset of diabetes, hypertension, obesity or depression. And, according to a report issued by the European Commission, there

*Science has been pointing the finger at this development for some time now, but not much is happening. We need support from governments ...”*

Samyukta Manikumar

may even exist a connection with an elevated risk of cancer.

#### **Death by disorientation**

The impact of light pollution, however, is magnified when it comes to animals and plants. Due to the artificial light at night, it is possible that deciduous trees will lose their leaves later in the fall and thus become more susceptible to frost damage, and on heavily illuminated beaches, young sea turtles will not find their way to the sea. Even migratory birds can lose their orientation and collide with buildings at night when the lights are on.

But it is nocturnal insects which suffer the most from continuous light. Typically, they take their cue from the light of the night sky. Attracted by the many artificial light sources, the creatures circle the lamps until they are completely exhausted, thus becoming easy prey to predators. Needless to say, direct contact with the hot light source will often prove fatal. Studies show that up to 150 insects will die in a single night near a streetlamp. Multiplied by approximately 10 million streetlamps in Germany alone, this leaves 1.5 billion dead insects.

#### **More research is needed**

Which animal and plant species are affected, and how strongly, is being revealed very slowly – Samyukta Manikumar is discovering that the science of light pollution is only in its infancy. For this reason, she has created a database with available studies on the implications for the affected animal species in her home country – to strengthen awareness of the negative effects of light pollution. Manikumar is also active in the

International Dark-Sky Association (IDA) which is promoting education, research and networking around the world.

The goal ahead is clear for all involved: they intend to protect places which thus far have been spared from light pollution, as well as limit the extent of stress in other areas through education and collaboration with municipalities and cities. But what can actively be done against light pollution? Just turn the lights off, advises Manikumar, and adds: “If we are talking about private households, it is actually often small decisions that turn out to be very effective: turning off building or property lights at night or installing a timer; using lamps with a low Kelvin number – those with a warm yellow light – in the garden and ensuring they only face down and not give off light in other directions.”

The largest proportion of light pollution, however, originates from industry. According to Manikumar, this problem requires a different approach: “People must first become aware of the problem. Science has been pointing the finger at this development for some time now, but not much is happening. We need support from governments in order to become truly effective – not only locally, but nationally, and ideally, internationally. After all, the problem of light pollution affects us all.” ■



#### **ABOUT “IDA”**

The International Dark-Sky Association (IDA) is a consortium of researchers, astrophotographers and enthusiasts who have made it their goal to protect the night sky and provide education about light pollution. Globally, IDA comprises more than 500 official representatives, like Samyukta Manikumar from Kenya, who advocate for the aims of the organization on the local level.

# Making Big Leaps

Softer materials and more intense interactions with humans: the scope of capabilities of robots continues to grow. Research is strongly guided by the examples of animals and plants. Bionics as a model of perfection.

**B**irds are fascinating for many reasons. Ostriches, for example, with a body weight that can easily exceed 100 kilograms, will sprint across the savanna at speeds of up to 55 kilometers per hour. These flightless birds owe their running prowess to the structure of their legs – according to a hypothesis by researchers at the Max Planck Institute for Intelligent Systems (MPI-IS). Unlike humans, birds fold back their foot while pulling up the leg towards the body when running – a feature that has remained practically unchanged since *Tyrannosaurus rex* in the Cretaceous period.

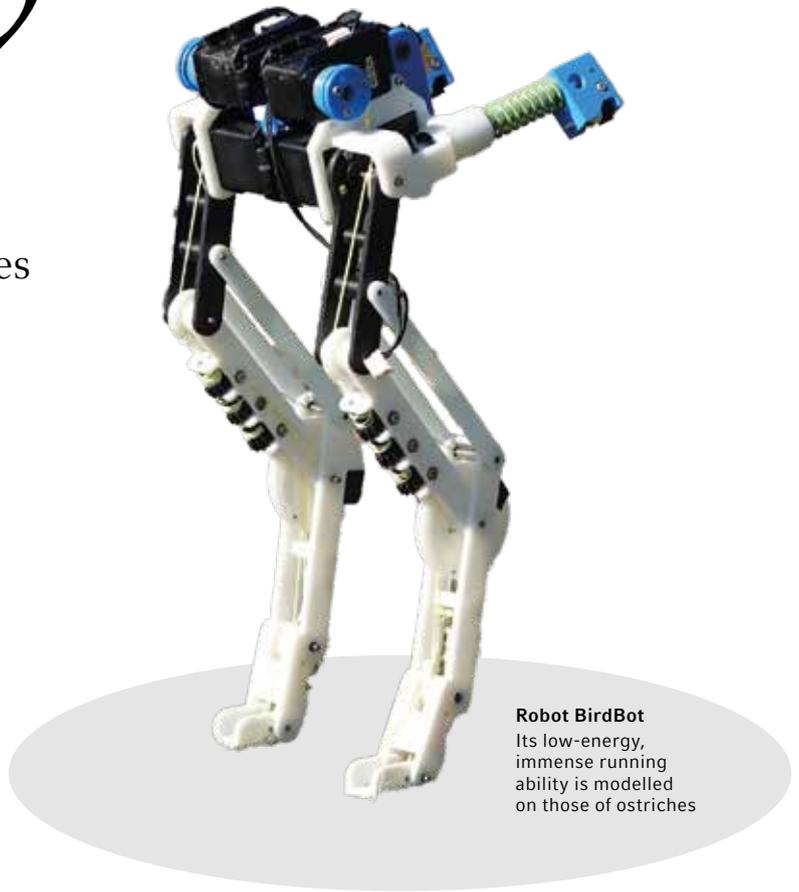
#### Quick as a bird

This principle of evolutionary success is what the researchers at the MPI-IS have now applied

to a robotic running mechanism. And indeed, the BirdBot has excelled during test runs through its particularly high efficiency – just like the locomotion apparatus of live birds, explains Alexander Badri-Spröwitz, head of the research group Dynamic Locomotion at the MPI-IS. “Previously, our robots were forced to work against the spring or engage a motor while either standing or lifting a leg to ensure that the leg would not collide with the

ground during the swinging phase.” This is no longer the case with BirdBot. “Altogether, it requires only a quarter of the energy compared with previous walking robots”, adds co-developer Alborz Aghamaleki Sarvestani. According to the scientists, their robot leg is amenable to scaling – even large robots can be made to run while maintaining a low energy expenditure.

Bionics is the term for this principle, which borrows



**Robot BirdBot**  
Its low-energy, immense running ability is modelled on those of ostriches

strategies from animals or plants and transfers it to technology. It starts with robot grippers which simulate the arms of an octopus, to maintenance robots which swim through pipe systems by utilizing the fin movements of the ocean planarian, all the way to specialized coatings that resemble shark skin to improve the aerodynamics of airplanes. Starting this year, Lufthansa Cargo is planning to equip its entire fleet with this technology in order to save approximately 3,700 tons of jet fuel and almost 13,000 tons of CO<sub>2</sub> annually.

Visually, the giants of the air will bear no resemblance to the emperor of the oceans. Importantly, bionics attempts to not simply imitate its model, but instead, based on nature's strategies, it provides innovative solutions to technological questions and demands.

#### **Interdisciplinary at all times**

Experts from the fields of biology, physics, materials science and engineering collaborate across disciplines. Many researchers are particularly intrigued by energy efficiency and lightweight construction, as well as by nature's combination of power and flexibility: these are the qualities which typically elude heavyweight industrial robots made of steel. The very young field of softbots – flexible robots made from soft materials – would not have been imaginable without its blueprints from nature. In this fashion, the German manufacturer Festo develops robots and grippers which are capable of interacting safely with their human colleagues.

Thanks to their flexibility, soft robots are also a good choice when it comes to extreme

situations: Chinese researchers enabled a robot inspired by the snailfish to dive to the deepest point in our oceans – the Mariana Trench. This is where the small robot made from silicone, and its delicate electronics, withstood the pressure of a water column 11 kilometers high.

#### **Amazing bounce**

A team from the University of Colorado Boulder and the MPI-IS in Stuttgart have instead taken a leaf out of the spider's book. Their arachnobot can leap across distances ten times its body height. The centerpiece: the joints are inspired by spiders which, through utilization of hydraulic forces, function similarly to the stretching of a leg by the creature. According to the researchers, these joints are highly functional; they are simple and cheap to produce, and they consume very little electricity. "It was not the ultimate goal of our research to construct a spider robot" says Philipp Rothemund of the MPI-IS. "Rather,

we set out to develop a state-of-the-art, active joint that can be incorporated into any type of robot."

Until this can be achieved, however, researchers will have to continue to overcome a number of hurdles as their softbots are not readily compatible with conventional and standardized robot systems, explains Christoph Keplinger, director at the MPI-IS: "We must therefore develop novel, effective and robust interfaces for the functional soft materials in order to integrate individual components into powerful robot systems."

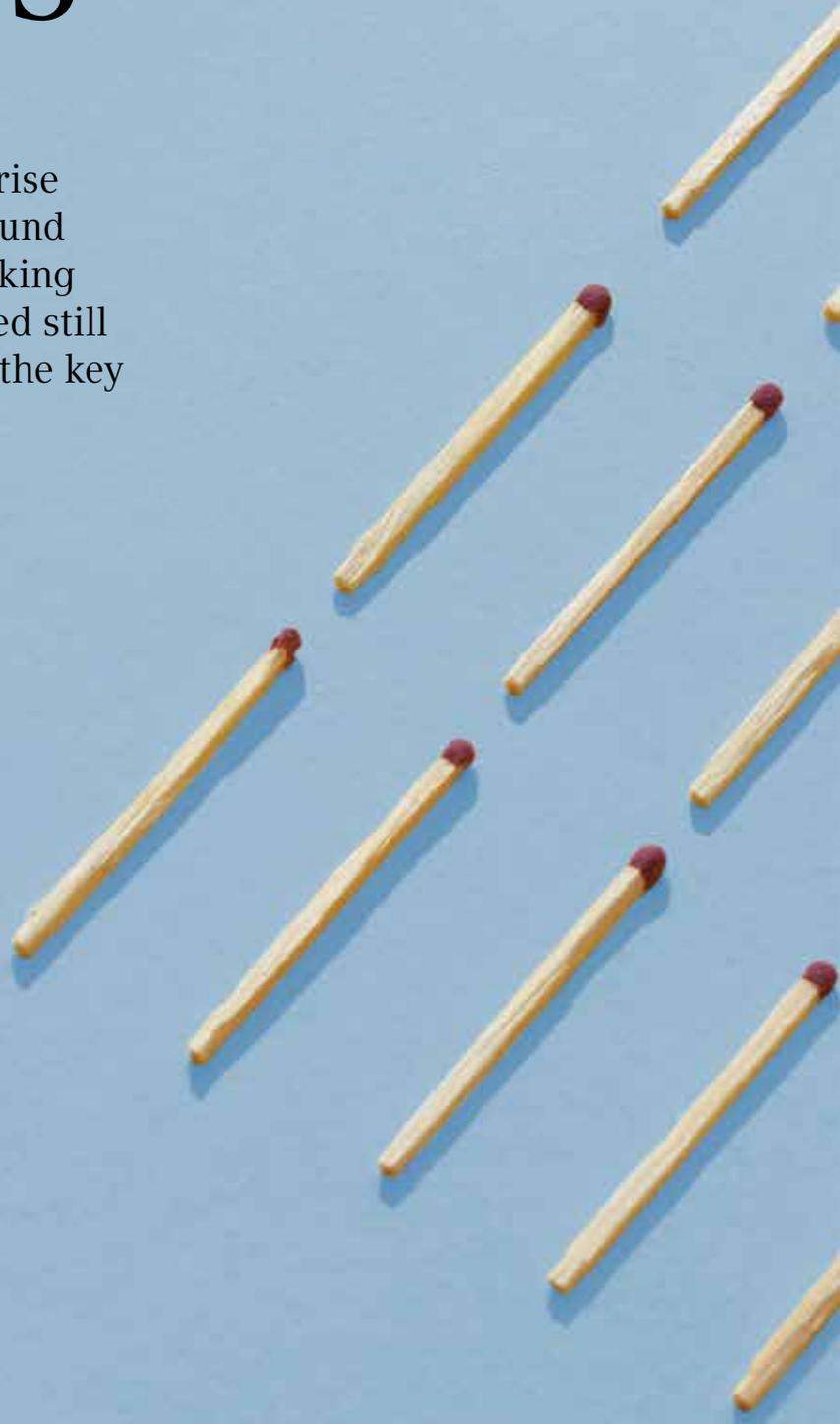
Not all bionic concepts make it all the way to practical application. And it is not necessarily the goal. Many consider these concepts to be applied basic research, with the intention of furthering biology and technology alike. After all, bionics mimic their models based in nature: sometimes, it just takes a longer time and additional development to reach perfection. ■



**Lightning fast**  
Ostriches are true sprinters – and serve as a model for robotics research

# Good Days, Bad Days

Psychological problems are on the rise worldwide. Even though taboos around psychological ailments are now making room for a new reality, those affected still suffer from prejudice. Resilience is the key to mental health.



**Burnt out**

Mental illness is more visible today than it used to be, but there is still room for improvement in terms of care and prevention



**T**he fact that with the move of Prince Harry's wife, Meghan Markle, into the British Royal Family, two worlds collided, has been public knowledge since long before the couple's flight to the US. The Royal Family, however, seemed especially incensed when the Duchess spoke openly about her mental health. In an interview with Oprah Winfrey in March 2021, Meghan reported that she was plagued by thoughts of suicide. "At the time, I was afraid to mention it. I simply did not want to live any more. It was a very real, clear and frightening thought that was always present", she said. Asking the Royal Family for psychological help, she was told "no". The reason, says Meghan, was their fear of damage to their reputation.

#### **When the burden weighs heavy**

No longer trivializing, disguising or hiding – Duchess Meghan joins the lineup of celebrities who are putting an end to the denial of mental health problems. Last year, American gymnast Simone Biles made headlines with her resignation from the Olympic Games. Due to mental health problems, the four-time Olympic champion quit in the middle of the 2020 finals. "Sometimes I really feel that I am carrying the weight of the world on my shoulders", the star gymnast wrote later.

With her openness, the 19-time World champion struck the right chord with many fans and colleagues. "Gratitude and support are what Simone Biles deserves", tweeted White House spokesperson Jen Psaki. Former champion swimmer Michael Phelps said this decision broke his heart. "As somebody who's struggled with depression and anxiety, Biles' opening up and talking about mental health is a big, powerful step forward toward blowing the stigma out of the water", Phelps told "People" magazine following the award ceremony for the Hope Award for Depression Advocacy. ►

In 2017, following his retirement, the winner of 28 Olympic medals declared openly that he suffered from depression, and since then, he has been advocating for more openness when it comes to psychological illness. According to Phelps, many people are still afraid to talk about their illness because they fear stigmatization and dismissal. “We just need more people to open up and continue to break this wall down”, emphasized Phelps.

#### It can happen to anyone

The experiences of celebrities clearly show that even fame and wealth are no guarantee for a carefree life – and that psychological illness can affect anyone. It is a fact that recently, more and more people have been suffering from mental illness. According to a study by the University of Queensland in Australia and the University of Washington, the COVID year 2020 resulted in an additional 53 million cases of severe depressive illness and 76 million cases of anxiety which can be attributed to the pandemic. This translates to a worldwide increase by 28 percent and 26 percent, respectively, the researchers report in “The Lancet”. Women and young people are especially affected. And according to the World Health Organization (WHO), the war against Ukraine caused an additional decline in health in Europe. Throughout the European WHO region which, in addition to the EU, also includes Ukraine and Russia, more than 150 million people had already suffered from psychological health problems in the year prior to the war.

#### A lack of treatment options

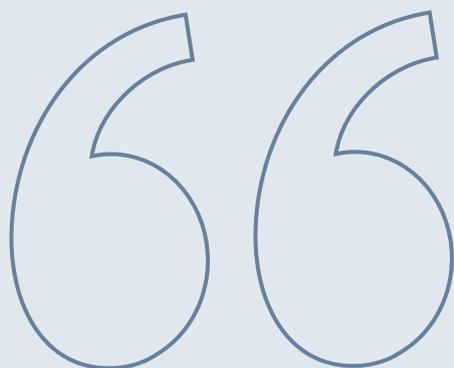
At the same time, the care for these patients leaves much to be desired. Even though the European region enjoys the best ratio worldwide when it comes to psychiatric care (per 100,000 residents, 50 psychiatric professionals are available, among them psychiatrists and nurses, as well as social workers and speech therapists), according to the WHO, even here, only about every third person with depression gets help. Norway cares particularly well for those with psychological illness. On average, 48 psychiatrists look after 100,000 people whereas in some other European countries, one psychiatrist may be responsible for the same number of people. The authors of the “Lancet” study are appealing to governments: “This pandemic has created an increased urgency to strengthen mental health systems in most countries.”

#### Widespread stigmatization

In addition to experiencing a lack of care, many of those affected by mental illness worldwide suffer from prejudice. A longitudinal study conducted at Indiana University in Bloomington revealed that while among Americans, stigmatization of people with depression has declined since 1996, rejection of those with a diagnosis of, for example, schizophrenia or alcoholism, has further increased. With respect to Germany, a longitudinal study by the University of Greifswald arrives at a similar conclusion. “It is encouraging to find more progressive attitudes toward mental illness among millennials and to see public stigma around depression significantly decreasing”, says Brea Perry, co-author of the American study.

**Before it is too late**  
Strengthening  
resilience can prevent  
serious mental illness





*The pandemic illustrates the need to strengthen health care systems in most countries.”*

Authors of a study published in “The Lancet”

### **Strengthening resilience**

In order to ensure that psychological illness will not be exacerbated further, especially in times of pandemic and war, health experts worldwide are advocating for a strengthening of resilience – that psychological strength which helps us deal with crises and tragedies. The foundation is laid in childhood – for example, through a reliable and loving environment. Preschools and schools, too, feature more and more concepts for the support of resilience. Of course, psychological resilience can still be actively exercised during the adult years. In its program “Road to Resilience”, the American Psychological Association (APA) lists ten important factors, among them, for example, actively building relationships and accepting change, as well as acting in a goal-oriented and proactive manner.

Meanwhile, advocacy groups and foundations around the world, such as the Mental Health Foundation of New Zealand, do important work to further the acceptance of those affected. In Switzerland, the magazine “Anxy” addresses those with psychological illness who, as authors, describe their own experiences. The honesty of affected celebrities and the new openness with which psychological suffering is discussed on social media may be the first step on the long journey towards the inclusion of those suffering from psychological illness. In the best case scenario, increased resilience will lead to better mental health worldwide. ■

“However, the increasing stigmatization of schizophrenia and alcohol dependency is concerning. Taken as a whole, our findings support rethinking stigma and retooling stigma reduction strategies to improve public attitudes surrounding mental illness. There is a lot of work left to be done”, emphasizes Perry.

Frequently, work turns out to be the best medicine for those afflicted with mental illness – professional rehabilitation is an important step back to an active life. Unfortunately, however, society is not helpful. In many European countries, people with psychological ailments do not have ready access to the labor market, and they frequently end up in workshops for the disabled. In this respect, the US is more advanced: increased acceptance of the inclusion of those with mental illness has been observed for some time. “First place, then train” is what Americans call this approach of placing people in companies without prior training. Studies show that their success in securing a regular job is twice that of those previously trained in a workshop.



**No loners**  
People need other people  
to be mentally stable



# How to Protect Our Psyche

Life is not a long, calm river. Instead, alongside happy moments, it also holds in store for us a number of challenges. These five tips will boost our mental and emotional strength to help us cope with everyday life.



## Gregarious and Healthy

# 1

Laughing together and sharing positive experiences and simply spending time together: most people enjoy the company of others and need regular social occasions. A team of researchers from the Central Institute of Mental Health (CIMH) in Mannheim and the Karlsruhe Institute of Technology (KIT) describes in the journal "JAMA Psychiatry" how important everyday social contacts are for psychological health. Using repeated short questionnaires, the researchers captured the psychological well-being as well as the social contacts of the study participants over a period of seven days. The results were clear: people felt better in the company of others than alone. An additional group further had their brain volumes measured using magnetic resonance imaging (MRI). This study showed that people who benefit more from social contacts also exhibit increased social competencies, as well as structural changes in a part of the forebrain which is associated with resilience and the risk of psychological illness. According to the researchers, these results underline the importance of interpersonal exchange for our mental well-being. ►

# 2

## ! Checking Out

Even a one-week break from Facebook, Twitter and the like will measurably improve well-being – these are the findings of a recent study conducted at the University of Bath. For the purpose of their study, published in the journal “Cyberpsychology, Behaviour, and Social Networking”, the researchers divided 154 participants between 18 and 72 years of age, who spent an average of eight hours per week on social media, into two groups: one group put the smartphone away for a week whereas the control group continued social media use as before. Prior to this, the researchers had determined the psychological states of the participants with respect to anxiety, depression and well-being. The result: after one week, those who had refrained from using social media felt significantly better in all three areas of mental health than those who had continued to use social media. “Scrolling social media is so ubiquitous that many of us do it almost without thinking from the moment we wake up to when we close our eyes at night”, said principal investigator Jeff Lambert. Once use becomes associated with stress, it’s time to slow down. “Many of our participants reported positive effects from being off social media with improved mood and less anxiety overall. This suggests that even just a small break can have an impact”, says Lambert.



# 3

## ! Man’s Best Friend

Pets alleviate depression, anxiety and stress. Studies conducted at Miami University and Saint Louis University have shown that pet owners benefit from their pets in many ways. They have higher self-esteem, are physically fitter and less lonely; they are more conscientious and extroverted, as well as less anxious. Moreover, people feel needed and loved if they have to look after an animal – be it ever so small. A research group led by Hae-Jin Ko in Daegu, Korea, tasked older people for a period of eight weeks with the care of five – yes, really! – crickets. At the end of this time period, participants were suffering less from depression than the control group which had not looked after animals. A similar effect has been demonstrated for time spent in nature. Dog owners thus benefit doubly from their regular walk in the park.

# 4

## ! Talk is Golden

When it comes to mental health, conversations can do a lot of good. In Switzerland, the campaign “How are you?” is encouraging people to talk about and address their feelings. “Those who can name their feelings can take specific action against the stressors and, if needed, benefit from support. Positive emotions, too, will be experienced more consciously and may serve as a resource for mental health care”, the campaign states. Talking about problems is becoming ever more important as psychological stresses have the potential to develop into disease in the long term. Waiting for the right moment, finding an appropriate location, listening, showing compassion and enduring silence – all these are aspects of a compassionate conversation. Especially children exhibit a considerable need for conversation, emphasizes the Nationwide Children’s Hospital in Ohio, USA. Pediatric Psychologist Ariana Hoet advises parents to seek conversation with their children on a regular basis. Families who make it a habit to talk to each other every day have an easier time supporting their children through mental health crises. “We know that conversation is one of the simplest, most effective ways to make an impact, break through stigma and give kids a voice when it comes to their mental health”, says Hoet.



## ! Move!

Exercise benefits mental health – for their review study, researchers at the University of Belgrade compiled close to 27,000 scientific studies in 2021. Of these, they studied 20 in detail. “Each study confirmed that physical activity affects the mental health of people of different health status, gender and age. Dealing with any type of physical activity leads to a reduction in the symptoms of psychological illnesses such as anxiety, depression, schizophrenia and a sedentary lifestyle”, emphasize the authors led by Aleksandar Stojmenović from the University of Niš in Serbia. Among other benefits, regular exercise also lowers stress, increases cognitive function and allows us to sleep better – and this is true for everyone. “Also healthy people should regularly use physical activity to maintain mental well-being”, add the researchers. The WHO recommends a weekly regimen of 150 to 300 minutes of moderate aerobic activity (fast walking) or 75 to 150 minutes of high-intensity exercise (running or fast cycling). Plus, strength training twice a week. Let’s go!

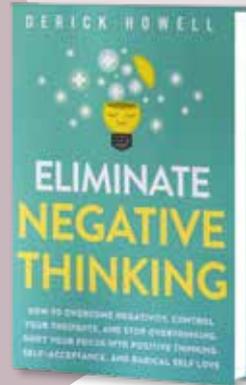
# 5

## Start Thinking Positive Now

**How to control your negative thoughts and stop brooding. How to shift your focus to happiness, self-acceptance and radical self-love**

Thoughts can create reality. Not every one, but your own way of thinking can certainly do that. The US American Derick Howell is considered a specialist in highly effective programs against anxiety, stress and panic and has summarized his diverse findings in 2020 in the book "Eliminate Negative Thinking". In essence, it is about how to direct your negative thoughts into the positive and thus find more happiness.

Derick Howell, 141 pages,  
Inner Growth Media, approximately €15



## Media to a Minimum

Irritability, problems falling asleep and an overall lack of sleep can occur as a result of excess media consumption. This creates stress, which in turn will negatively impact mental health. Those who wish to put their smartphone aside more often will find the following tips and tricks helpful:

- Determine times during which you cannot be reached and when you will turn all devices off.
- Do not take your smartphone to bed with you, and ideally ban all other devices from your bedroom.
- For a defined period of time, engage in "digital detox" by consciously doing without all digital devices. Vacation is the ideal time for this type of "detox".

# Mentally in Good Shape

Our own mental health needs attention. Encouragement supports self-care. From breathing exercises to digital detox – three tips.

## Coming Down

The breathing exercise "4711" is not only easy to remember, it's just as easy to practice. Simply sit or lie down and relax. Then inhale for four seconds and exhale for seven. Repeat eleven times – and experience the sensation of deceleration. This method – recommended by Thomas Loew, Professor of Psychosomatic Medicine and Psychotherapy at the University of Regensburg – slows breathing and thus supports relaxation and stress reduction.



# INSIDE Eppendorf

What awaits you here at Inside Eppendorf? The success story of Eppendorf centrifuges, sustainability on many levels, a competition – and our top company highlights



## SUCCESSFUL YESTERDAY & TOMORROW

Historically grown:  
Eppendorf centrifuges – a must-have  
in laboratories worldwide

## MANAGING WITH FORESIGHT

Helping to shape the future  
by conserving resources:  
Eppendorf goes green!

# Full Speed into the Future

## From A to Z

2022: the Eppendorf portfolio offers users solutions from mini benchtop centrifuges to ultracentrifuges for all separation applications in the life science sector

Since the introduction of the first centrifuge as part of the microliter system in 1964, it is impossible to imagine laboratories worldwide without Eppendorf centrifuges.

**T**he year 1961 not only represents a major milestone in the history of Eppendorf, but also for scientists in laboratories worldwide. With the invention of the piston-stroke pipette, the days when samples had to be “pipetted” by mouth were over. In the following years, the “Eppi”, thermomixer, and the first microcentrifuge, Centrifuge 3200, completed the so-called microliter system. This system made it possible to process the smallest samples and thus revolutionized research in the life science sector, true to the mission of the founding fathers Dr. Netheler and Dr. Hinz: to make a contribution to improving human living conditions.

### Support from Leipzig

The Centrifuge 3200, which can still be found in laboratories today, was only the beginning of a long success story: in the following years, many more Eppendorf centrifuge models came onto the market, all of which were equally distinguished by their high quality and user-friendliness.

To meet the constantly increasing demand and to gain innovative strength, Eppendorf acquired the Leipzig centrifuge manufacturer Heinz Janetzki KG in 1991, a former family-owned company, which was founded in 1945 by Arthur and Heinz Janetzki. They started with the production of hand-held centrifuges, which was to prove a success story: just a few years later, the first electrically operated centrifuge models followed.

Due to the steady build-up of medical and biological research institutes and hospitals after the war, the products experienced high demand, which led to Janetzki Zentrifugen KG becoming the largest laboratory centrifuge producer in Germany in 1959. In the 1960s, Janetzki laboratory centrifuges were already exported to 40 countries worldwide – a real export hit at that time. The portfolio back then included not only benchtop centrifuges, but also high-performance and ultracentrifuges. Through this acquisition, Eppendorf not only gained a considerable treasure trove of

engineering expertise, but at the same time took a major step forward in production capacity: In mid-1991, production of Eppendorf laboratory centrifuges was completely relocated to Leipzig, where around 100 employees were working at the time. Only 10 years later, production capacity had already increased tenfold, impressively demonstrating the immense demand for the high-quality products.

#### Successful acquisition in Japan

The acquisition of Janetzki KG was not to remain the last in the history of Eppendorf centrifuges: in 2020, Eppendorf AG expanded its already extensive benchtop centrifuge portfolio to include the centrifuge division of the Japanese company Koki Holdings Co., Ltd, whose products were sold internationally under the Himac brand. It thus expanded its portfolio to include high-quality high-speed and ultracentrifuges, as well as rotors, consumables, and, of course, service offerings. In this way, Eppendorf is fulfilling the wish of our customers to receive solutions for their workflows from a single source – in line with the microliter system.

With this new complete solution in the field of centrifugation, we are making a promise to our customers today: the high quality, user-friendliness and safety of our products, as well as our many years of experience and innovative strength, allow them to concentrate on what really counts: their research. To improve human living conditions. ■

#### HISTORY OF THE CENTRIFUGE



- **1867:** Wilhelm Lefeldt invents the milk drum centrifuge to speed up the process of butter production. This leads to a revolution in the dairy industry in 1877, when Gustav de Laval develops the design into a flow-through centrifuge.
- **1925:** Theodor Svedberg invents the analytical ultracentrifuge, achieving speeds of up to 1,000,000 x g.
- **1955:** The first "Himac" ultracentrifuge is built in Japan (at that time still under the name "Hitachi Koki Co., Ltd.") - the model 40 CP. This model was to be followed by many more to this day.
- **1964:** Eppendorf launches the Centrifuge 3200 as part of the microliter system, revolutionizing life science research worldwide.
- **Today:** Centrifuges are part of the intelligent laboratory: as networked devices, they become powerful tools in the laboratory of the future.



#### Premiere

The first Eppendorf microcentrifuge was launched in 1964 as part of the microliter system



Climate Change



Natural Resource

# Sustainable All the Way

With the goal of protecting the environment and the climate as best as possible, Eppendorf acts far-sightedly and responsibly. And precisely where its own room to maneuver can unfold.

**S**ustainability as a self-image is firmly anchored at Eppendorf – and now also transparent and accessible in the first Sustainability Report 2021 of the now globally established Eppendorf SE.

The manufacturing processes of all types of Eppendorf products have an impact on the environment and the climate. All corporate decisions concerning production and all production sites are therefore geared to making a significant contribution to climate protection. Eppendorf has set itself the goal of reducing its CO<sub>2</sub> emissions as much as possible and always using the latest sustainable energy, technologies and materials. Environmental standards that apply throughout the company help to continuously improve the climate footprint. The results of these and other efforts over the past decades can be seen in the presentation of recorded and documented greenhouse gas emissions - which can be read in the Sustainability Report 2021.

## Focus on strengths

The urgent task of protecting the climate in the best possible way presents numerous challenges – but also many opportunities. Eppendorf sets its priorities where it can most effectively contribute to the sustainable development of business and society. This results in guiding themes with which the ecological, social and economic harmonization of the company's business activities can be achieved in the best possible way:

- Eppendorf intends to achieve a corporate climate neutral status by cutting the CO<sub>2</sub> emissions to zero
- Eppendorf aims to become an industry leader and take on an industry-wide leadership role
- Eppendorf has the goal of being the best employer in the life science industry by 2025



## Social Compliance



**Important for all**  
A strong commitment to sustainability is important to Eppendorf and its customers and stakeholders



In dialog with internal stakeholders and external experts, the important topics for sustainable business have thus been identified. Eppendorf’s sustainability activities along the value chain are now embedded in four strategic guiding themes: “Climate Change,” “Natural Resources,” “Social Compliance” and “Social Well-being.”

### Stronger in the union

And even more: As a further step in its commitment to sustainability, Eppendorf signed the United Nations Global Compact in January 2022. This commits Eppendorf, as part of this global network, to act responsibly on the basis of ten defined principles. Applicable human rights, labor standards, environmental protection and corruption prevention are the guiding principles. At the same time, Eppendorf promotes and supports innovative solutions for the realization of Sustainable Development Goals (SDGs).

### Committed to engagement

The fact that Eppendorf has the enormous potential to change things for the better is due above all to its nearly 5,000 employees. They work for the Group worldwide with commitment, flexibility, and a willingness to learn and perform. Also in the interest of its many stakeholders and customers, Eppendorf is sincerely committed to continuing to align and shape all its decisions and activities in a sustainable manner. ■

More information on sustainability at Eppendorf can be found at:

[www.eppendorf.com/sustainability](http://www.eppendorf.com/sustainability)



# Lab



2



1



3

# Lifestyle

## 1 Tips from the Communication Professional

“(Almost) Everything Simply Explained” is the name of the new book by science journalist, blogger and Tik-Toker Niklas Kolorz. The two-time Grimme Online Award 2021 winner has a few communication tips for researchers:

+++ Know your audience: who am I actually talking to? Where lies the enthusiasm of these people? What is my target group interested in? My communication content and approach should match. +++ Be “beginner-friendly” – explain each term in such a way that it remains comprehensible overall. +++ What is important and

what is not? I always focus on one topic in my videos. One question is answered, and for that you can get a lot out of one minute. +++ Especially in scientific disciplines, where there is a shortage of specialists, there should be more communication. A chance to inspire the next generation! +++ Timing is important: My video about wasps in August reached three million views on Facebook. +++ And I always say: People should either laugh or learn. If you can do both with your communication, you hit the jackpot!

[www.niklaskolorz.de](http://www.niklaskolorz.de)

## 2 Knowledge Creates Benefits

Are you interested in exchanging ideas with international industry colleagues and Eppendorf experts? We offer the Eppendorf Lab Channel, a free virtual platform where you can interactively participate in webinars, product demonstrations and events. Learn how to get even more lab routine. Use our product demonstrations, webinars or other events for education, sharing and networking. And ask questions in our livestreams, which we answer promptly. Our experts provide insights on how you can build a digital and sustainable lab or optimize pipette and sample handling. Benefit from our expertise now and let’s create a new, virtual lab world together. Are you ready for your head start? Then register now here at:

[www.eppendorf.com/labchannel](http://www.eppendorf.com/labchannel)

## 3 Booming Genre: Climate Science Fiction

In the Volkswagen Foundation’s research project “Climate Change Literacy,” literary scholar Julia Hoydis is investigating what literary reading can achieve in terms of dealing with climate change. Three questions for the expert:

**Ms. Hoydis, what reaches people better when it comes to the topic of climate change: scientific texts or climate fiction novels?**

This also addresses the question of why science has been failing for a good two decades now to communicate the urgency of the issue in such a way that something changes. Few people want to listen to ongoing, sober crisis communication and dire warnings. Climate fiction novels certainly have the great advantage here that they can also be entertaining. However, one has to look closely: those who read climate fiction belong to that part of the population that already pays attention to the topic and also follows other research and media reports on it. So whether this literature really reaches and informs a different audience is questionable.

**Nevertheless, does “climate change literacy” pursue the intention of getting people to do more for climate protection?**

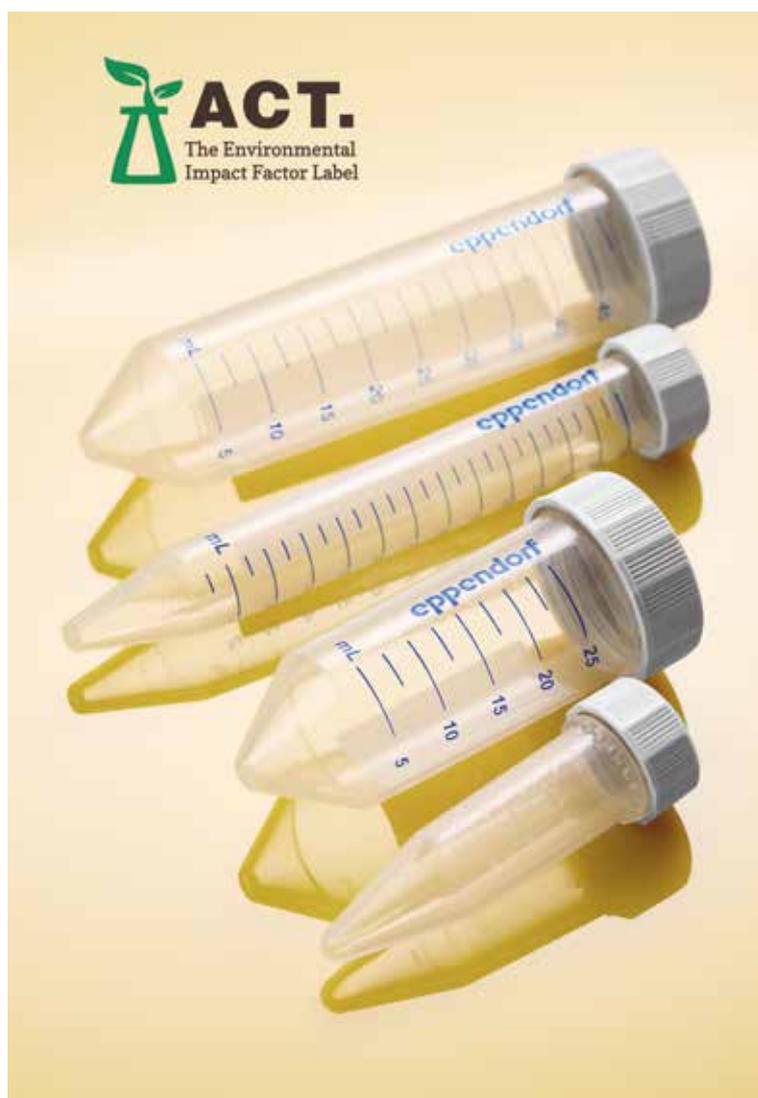
One should generally always be cautious about talking about intentions and effects in literature, as these are comparatively difficult to measure. There is a lot going on in the field of empirical ecocriticism. In my view, by the way, the welcome effect is not primarily that people get involved in more climate protection, but that they develop the ability to understand complex interrelationships. This makes it easier to master many crises.

**Please tell us your favorite cli-fi novel.**

James Bradley’s “Ghost Species” is set in Australia and is about a secret project that is trying to save the climate by reviving extinct species, in other words, through reengineering. There has been little literature about this. The protagonist, a scientist, is also drawn into an experiment to recreate a Neanderthal baby, with whom she develops a very close bond.

# News at a Glance

Making laboratory work more efficient – Eppendorf develops solutions for this. As well in terms of sustainability, things are always moving forward – here is an overview.



## Bioplastics on the Way to Your Laboratory

Plastic consumables play an important role in laboratory work. However, there are ecological downsides: plastic consumables are made from fossil fuels, which release large amounts of CO<sub>2</sub> in the course of their production, processing and disposal. Bioplastics made from renewable resources such as sugar cane or corn could provide a solution. At first glance, this approach is a good alternative, as greenhouse gases could be saved; however, it can have negative environmental consequences, for example, through land use for nonfood production, loss of biodiversity, and the use of fertilizers. Recent ideas have focused on agricultural or food waste as resources for new materials – such as conventional cooking oil, which is produced in large quantities in the food manufacturing industry. This oil can be processed into bio-naphtha, which can be converted into basic chemicals such as propene. Propene is further polymerized into polypropylene granules, which can be used to make conical containers, for example. Another step toward a circular economy.

◀ [www.eppendorf.com/gb-en/lab-academy/lab-solutions/eppendorf-tubes-biobased/](http://www.eppendorf.com/gb-en/lab-academy/lab-solutions/eppendorf-tubes-biobased/)



## Lab Routine in Focus

Do you know BioNews? Our application-oriented customer magazine has been published twice a year since 1993 and is a popular source of information for researchers and scientific personnel. The long-standing readership appreciates the mix of product reports, application notes and tips for everyday laboratory work. Topics such as digitization, sustainability and continuing education are also regularly covered. In the lead article of the Summer 2022 issue (No. 57), for example, you can learn how to expand your cell culture know-how – with various continuing education formats for newcomers and advanced users. Free subscription or download at: [www.eppendorf.com/bionews](http://www.eppendorf.com/bionews)

# A “Cheerful Pessimist”



Kelly Nguyen likes to explore new paths and is often surprised by her own success. Just recently, the molecular biologist presented groundbreaking therapy options for the fight against cancer and aging. ▶

**T**he time just before a breakthrough can be tough. Kelly Nguyen has difficulty sleeping – she is completely absorbed, and she would prefer to work nonstop. Finally, the time has come. In the laboratory, the pieces of the puzzle, collected over many years of work, come together naturally. Looking at it this way, it is probably a good thing that her work is slow and arduous, instead of robbing her of her sleep on a weekly basis.

Finding the inner core – taking one good look deep inside the cell and understanding what makes such a system tick – Kelly Nguyen is practically gripped by this mission. Since she began working on her doctoral thesis in 2010, the now 34-year-old has been pursuing the visualization of biological molecules. The technological breakthroughs in the cryo-electron microscopy field in 2013 meant to her what the invention of the telescope in the 17th century must have meant to astronomers: a milestone, and the basis for entirely new insights.

#### Two genius discoveries

In 2015, it helped her achieve her first large breakthrough: she was able to determine the three-dimensional structure of a major part of the spliceosome. Thus far, this complex molecule had only been partially explored. Inside the cell, the molecule plays a role during the complicated RNA splicing process. And recently, in her most recent breakthrough, she successfully visualized the enzyme telomerase. In human cells, it restores the ends of the chromosomes – the telomeres. More on both topics later. This discovery has the potential to benefit many future patients suffering from

cancer or from illnesses related to premature aging. “This new knowledge about the three-dimensional structure will allow, for example, the development of more precise medications for cancer”, hopes Nguyen. After all, telomerase plays a role in 85 to 90 percent of all cancers whereas a telomerase deficiency is connected to syndromes of premature aging.

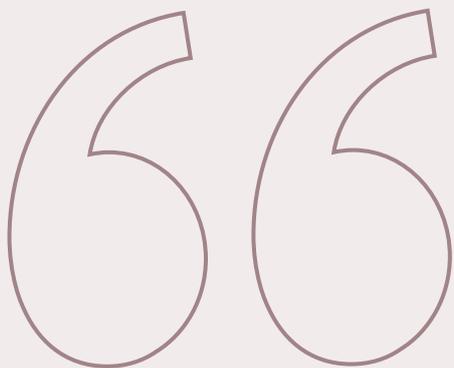
#### Career ingredient: education

Kelly’s path leading up to this success story was long, and it asked a lot of her. It all began with a gold medal at the 2003 South Vietnam Math Olympics. To her, this was a signal for departure. A year later, the world beckoned, and at the young age of 16, Thi Hoang Duong Nguyen heeded the call. Alone. Her family, her parents and her two sisters live in Vietnam to this day. Kelly, the name she uses abroad, received



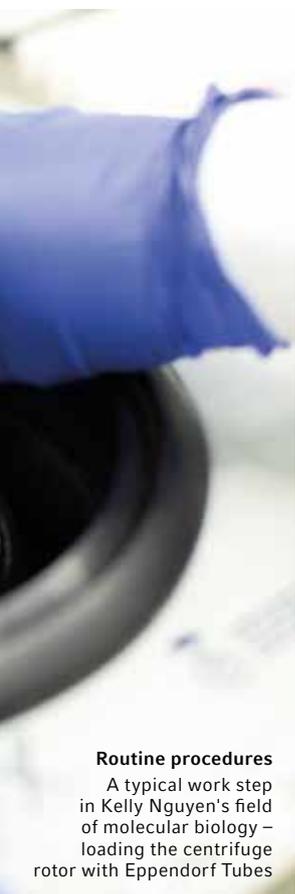
**Well equipped**  
With the help of the Centrifuge 5424 R, Kelly Nguyen can prepare the proteins she is interested in





*I don't start out expecting a good result – regardless of how it turns out, I am a happy person.”*

Kelly Nguyen



#### Routine procedures

A typical work step in Kelly Nguyen's field of molecular biology – loading the centrifuge rotor with Eppendorf Tubes

an opportunity to attend High School in New Zealand. A foreign environment with a foreign language. “This was where I learned to adapt to new environments quickly and maintain a positive attitude even if things are difficult.”

A time-lapse summary of her career: at the age of 18, she entered the Australian National University in Canberra, and at 22 she began her doctoral work at the University of Cambridge. She was 28 when she moved to the US to conduct research and 31 when she returned to Cambridge in 2019 to start her own group which currently comprises five laboratory members. What had made the deepest impression on her throughout these years? Above all, “it was my parents’ strong work ethic”, and the high value they place on education. It was these values that carried her around the world and that

allowed her to pursue a career that she loves.

By now, the researcher, who describes herself as being curious, organized, thorough and systematic, has a number of prestigious awards to show for herself – for example, she recently received the Eppendorf Award for Young European Investigators 2022, worth 20,000 euros. While the “cheerful pessimist” is not afraid of new challenges, she is occasionally prone to self-doubt. “I don’t start out expecting a good result – regardless of how it turns out, I am a happy person.”

#### All or nothing

“My work has clearly defined goals, and very often, it is about all or nothing”, says Kelly as she discusses the topic of innovative technologies and the modern laboratory instruments without which her discoveries would not have been possible: centrifuges, vitrobots for the preparation of cryo-EM samples, the Typhoon imager and many more. “We often work for a very long time before we get to lay eyes on our molecule of interest.”

And thus, she dedicated five years and her doctoral thesis to the spliceosome, an RNA-protein complex located inside the cell nucleus that plays an important role in gene expression. Prior to 2015, when its three-dimensional structure, reminiscent of a gel-like coral structure, was visualized, the spliceosome could only be analyzed in parts. Since 2016, Nguyen has also been studying telomerase which maintains the caps of the chromosomes. “When I started working on this, we knew very little about what this molecule comprises and what it looks like.”

Spliceosome and telomerase – how are they connected? Indeed, Nguyen discovered a number of similarities: “Both belong to a family of macromolecules we call ribonucleoproteins.” Both are large – at least by macromolecular standards – and flexible. They are difficult to produce in large quantities in the laboratory, which is why they had remained elusive to researchers for so long.

#### Unexpected discovery

These novel visualizations from inside the human cell nucleus were the key to her groundbreaking success. In addition, Nguyen detected unexpected components of telomerase: histones. Until now, biochemists were under the impression that histones were only involved in the packaging of DNA. The fact that they are also found in telomerase indicates a new role.

Nguyen will continue to pursue her research in this direction, and she will especially encourage and support young women “in the same way that I experienced support and encouragement from my parents and mentors.” And if her head does occasionally spin from all the laboratory work, she will turn to her passion, baking, and listen to audio books – preferably biographies – or she will go for a run and explore the beautiful walking paths around Cambridge ■

#### LEARN MORE?



Click here  
to the website:

[www2.mrc-lmb.cam.ac.uk](http://www2.mrc-lmb.cam.ac.uk)

# The Good in Fat

With his nonfiction book “The Fat Whisperer”, molecular biologist and biochemist Alexander Bartelt scored a “Spiegel” bestseller in Germany. The book reveals four surprising central discoveries.

## ! White Fat, Brown Fat

Too much sugar and animal fats in our diet are the reason that half the population is overweight, with a quarter even being considered obese. Above a body mass index (BMI) of 30, fat begins to deposit in areas of the body where it will lead to illness. As long as our fat is only stored in the “white fat tissue”, it plays an important role as the body’s energy reserve. It is vital for survival as it provides our bodies with the necessary fuel. Underweight people without fat reserves lack important messenger substances since fat cells also produce hormones to communicate with the brain which, in turn, controls our behavior and appetite. But there is also fat that is “all good” – the body’s “brown fat”. These fat cells are rich in iron and help the body regulate its temperature by burning high-energy sugars and fats.

## ! Abdominal Fat Makes Us Sick

Fat becomes dangerous when our metabolism is out of step. Fat cells can expand considerably, and subcutaneous fat tissue provides lots of space as the skin stretches. If, on the other hand, fat deposits arise inside the abdominal cavity, not much space is available, and fat cells can easily spill over. Fat will then take hold where it does not belong – in the liver and inside blood vessels. And: due to the lack of space, these fat cells are stressed, which leads them to secrete increased amounts of inflammatory hormones. Inflammation is considered a trigger for any number of diseases, including cancer. This is why a beer belly is especially harmful. The body mass index, however, is not the only indicator of disease risk – abdominal girth, too, is important: it should not exceed 102 cm in men or 88 cm in women.



## ! We Are Not Made to Lose Weight

Fat is an organ that consists of clusters of islands distributed throughout the body. Brown fat is located in the neck area, surrounding the blood vessels, and along the spine. Nerve paths and blood vessels traverse the brown fat, and hormones circulate, allowing this fat organ to communicate with the brain. Our fat cells are happy when they are being filled. Delicious food is coupled to the secretion of feel-good hormones whereas fasting ruins our mood. A weight-loss diet thus fights an uphill battle against the biology of the body: against our genetics and against our metabolism. Losing weight is a direct contradiction to the circuits of the brain. Also, fat tissue can be envisioned to resemble an air balloon which loses air during weight loss, but which will rapidly regain its volume if eating habits are not changed long-term.

## ! How to Activate Healthy Fat

A thermogenic lifestyle helps us stay healthy. Why? Brown fat contributes to the burning of calories by converting calories into heat. This is an evolutionary trick employed by mammals that allows them to maintain a consistent body temperature. In overweight people, the brown fat is frequently atrophied. The good news: it can be trained by incorporating cold stimuli into the everyday routine – a cold shower, an ice bath, keeping room temperature at 16 degrees, or dressing lightly outside. It is important, however, not to get too cold but at the same time not to bundle up too tightly. This approach can burn roughly 200 calories per day. Spicy foods, coffee and green tea, too, can activate the burning of fat. Once our metabolism is activated, positive effects on heart health and blood vessels are sure to follow.

### ! BARTELT – A BRIEF INTRODUCTION



Alexander Bartelt is a Professor of Cardiovascular Metabolism at the Institute for Cardiovascular Prevention at Ludwig-Maximilians-University in Munich. His research focuses on metabolic mechanisms which will result in better treatment options for obesity and diabetes. He is the recipient of multiple awards for his work, and he is especially successful in the art of science communication.

**Too much of a bad thing**  
Fat and sugar in excess make you fat and often sick in the long run. It is therefore advantageous to deal with one's energy utilization

**With patience and confidence**  
Carmel Harrington herself lost her son to sudden infant death syndrome – and now, after decades, she has found out what affected children may be missing



# A Chance at Life

Death comes without warning: seemingly healthy children fall asleep and don't wake up. Biochemist Carmel Harrington has found a possible trigger for sudden infant death syndrome (SIDS).

**You and your team at Children's Hospital at Westmead in Sydney have discovered a pivotal biomarker in connection with sudden infant death syndrome.**

**Carmel Harrington:** This is the enzyme butyrylcholinesterase, in short: BChE. It is an enzyme of the cholinergic system which regulates, among other things, the level of activation of our central nervous system – a process we call arousal. This activation makes sure that we are alert, awake and responsive. In the case of sleep apnea syndrome, where breathing repeatedly stops during sleep, activation ensures that the body awakens. We hypothesize that a deficiency of the enzyme BChE may lead to a reduced arousal response. As a result, the body of the child will simply not respond to a given environmental challenge, whether it be infection, apnea or CO<sub>2</sub> rebreathing as a result of prone sleeping.

**For decades, scientists have been aware of only potential factors that may promote SIDS, but not its cause. What had been missing?**

It is important for me to emphasize that we did not find a cause, but rather a marker of vulnerability. We know that not all infants with low BChE will die. We analyzed enzyme levels in more than 60 infants who had died of SIDS using their dried blood spots taken at birth – at a time when they were still alive. While previous studies had identified biomarkers, those had originated from the blood of babies who had already passed. So our finding raises, for the first time, the real possibility of one day being able to identify infants at risk for SIDS prior to death and to offer appropriate interventions. Someone once told me: "Searching for a biomarker for SIDS is like looking for a needle in a

“

*Our results could one day provide the basis for early identification of potentially vulnerable infants.”*

Carmel Harrington

haystack." Since we were able to establish a connection with the cholinergic system, we are hopeful that one day, we will be able to identify the causes contributing to SIDS.

**It is possible that you have found the deciding piece of the puzzle. How did it come about?**

To start looking at the haystack, you have to make a few assumptions – and mine was that arousal was involved. My doctoral thesis supported this assumption as it showed that infants at risk of SIDS had a marked arousal deficit. As I was a trained biochemist, the next logical step was looking at the enzymes of the cholinergic system, the system that regulates arousal.

**In 1991, you lost your son Damien to SIDS. Following this tragedy, you decided to focus your research on this topic. Did your personal history motivate you to persevere until you had reached your goal?**

When Damien died, I made a promise that

I would leave no stone unturned to try to work out why he died. I often wanted to give up because it was so hard. Many people even thought I was crazy.

The final study took much longer than expected due to Covid and as it was completely blinded, I had no idea of what the results were going to be until the very last day when the cases and controls were identified and statistical analysis completed. To be honest, I had come to terms with the idea that the results would in all probability be negative.

So, when on December 21, 2021, I did the final analysis, I was in shock. I could not believe it at first, so I redid and redid the statistics. After that I cried a lot. After all, Damien was the reason for it all. With limited funding available, I had started my fundraising page, Damien's Legacy, and it is only thanks to the donations I have received through this and the support of the community that we have been able to make this incredible discovery.

**This could be the breakthrough for SIDS. What are the next steps? Are there any recommendations or strategies for parents?**

Unfortunately, no. A lot more research needs to be done. At this stage, the very best advice I can give is to follow the recommendations and adopt safe infant sleep practices, breastfeed and don't smoke during pregnancy or expose your infant to environmental smoking. My hope is that one day this finding will enable a capability to screen babies at birth and to offer appropriate interventions so that every baby can go to sleep and just wake up. ■

# New Staples

Manioc, jackfruit, quinoa and millet – not the most prominent players on the global market. This is why they are considered “orphan crops”. These orphans, however, may be looking at a very bright future.

**E**ach spring, canola blossoms paint entire German landscapes a bright sunny yellow. Ever since the 16th century, this cruciferous plant has been a mainstay of our countryside – in the same way that the vegetable oil extracted from it is a mainstay on our supermarket shelves. Initially, however, the oil-rich seeds were bitter and inedible. Only after farmers had bred canola varieties without these bitter glucosinolates and erucic acid did they arrive at the current plant from which oil is pressed. According to the German Food Association (DGE), canola oil is considered the healthiest among the fats.

## From orphan to star performer

It was the inedible canola that researchers now consider an “orphan crop”. It had been an orphan among the plants, and it only became a star through the process of domestication – a career that other orphan crops are still awaiting. After all, while Earth holds approximately 300,000 edible plants in store for humans, only a fraction ends up on our plates.

Instead, rice, wheat and corn feed half of humankind while – according to the Global Hunger Index 2021 – more than 800 million people suffer from chronic hunger. Meanwhile, the war in Ukraine, and the associated supply shortages of wheat, further exacerbate malnutrition. For these reasons, scientists are working on cultivating orphan crops. In Africa, universities, industry partners and non-governmental organizations have come

together to form the “African Orphan Crops Consortium” with the goal of deciphering the genomes of the 101 most important African plant species.

Among them: ebolo. This plant, also known as *Crassocephalum crepidioides*, grows in Nigeria. With its basil-green leaves it resembles spinach, and it is consumed as a vegetable. Rich in vitamins and minerals, ebolo is also served as a popular salad in Australia and Asia. The downside: the plant contains a poison, even small amounts of which are capable of damaging the liver or even causing cancer. Researchers at the Technical University of Munich have thus set out to breed a variety without these toxins. Even the predecessors of today’s zucchini, tomatoes, peppers and potatoes employed toxins to protect themselves from pests, and it was only through breeding that palatable varieties were granted entry into our kitchens.

## Chinese roots

The Chinese yam, also known as nagaimo, tells a similar story. This starchy root, which contains substances that offer protection from cardiovascular illness, produce thin tubers. Its slightly sweet and nutty taste is reminiscent of that of the sweet chestnut. This tropical plant thrives exclusively in Asia and





**ALSO A MEDICINAL PLANT**

The Nigerian plant "Ebolo" contains many vitamins and minerals and is often eaten as a salad



**DELICIOUS AND HEALTHY**

The Chinese yam tastes similar to the sweet chestnut – and is said to prevent cardiovascular diseases

West Africa – deep underground. Harvest is challenging – the plant must be dug up carefully by hand. Now researchers at Westphalian Wilhelm University of Münster, together with their colleagues from Nigeria, are planning to employ molecular genetic methods to breed the plant in such a way that it will become larger, rounder and thicker – and thus more resilient. At the same time,

*Dioscorea opposita* is to become more robust against pests. The scientists are hopeful that, at the end of the day, Chinese yams could help people in Nigeria fight hunger as well as mitigate dependency on imports.

**Breeding local exotic species**

Moreover, the scientists are planning to cultivate Chinese yams as a crop in Europe. It would then qualify as a "local exotic" – an exotic crop grown locally, which satisfies our culinary wanderlust while at the same time fulfilling the demands of a planetary health diet – a diet which not only benefits people, but which also helps sustain Earth. In this way, food will not have to be flown from one country to another in a climate-damaging manner. The chia plant, for example, originates in Mexico, but it may now be grown in Germany – thanks to scientists at the University of Hohenheim in Stuttgart, who registered the variety "Juana" with the German Federal Plant Variety Office.

Quinoa is another orphan crop that is well-known in Europe. As early as 6,000

years ago, this South American plant, with its especially protein-rich seeds, served as a staple to pre-Columbian peoples, and today, it is celebrated as a superfood in Europe. The rising demand, however, leads to rapidly increasing prices of this pseudo-grain in cultivating countries such as Bolivia. For this reason, scientists are working on ways to adapt quinoa to a more moderate climate zone.

Orphan crops are being studied in more depth, and they are being adapted to meet our needs. This will help prevent unbalanced diets while at the same time contributing to more sustainable farming practices. By 2050 at the latest, when, according to UN projections, 10 billion people will inhabit Earth, these orphans among plants will contribute to eliminating hunger in the world – hopefully. ■



**NOT ONLY A TREND**

Quinoa is well known. But the South American plant also has the potential to satisfy hunger worldwide



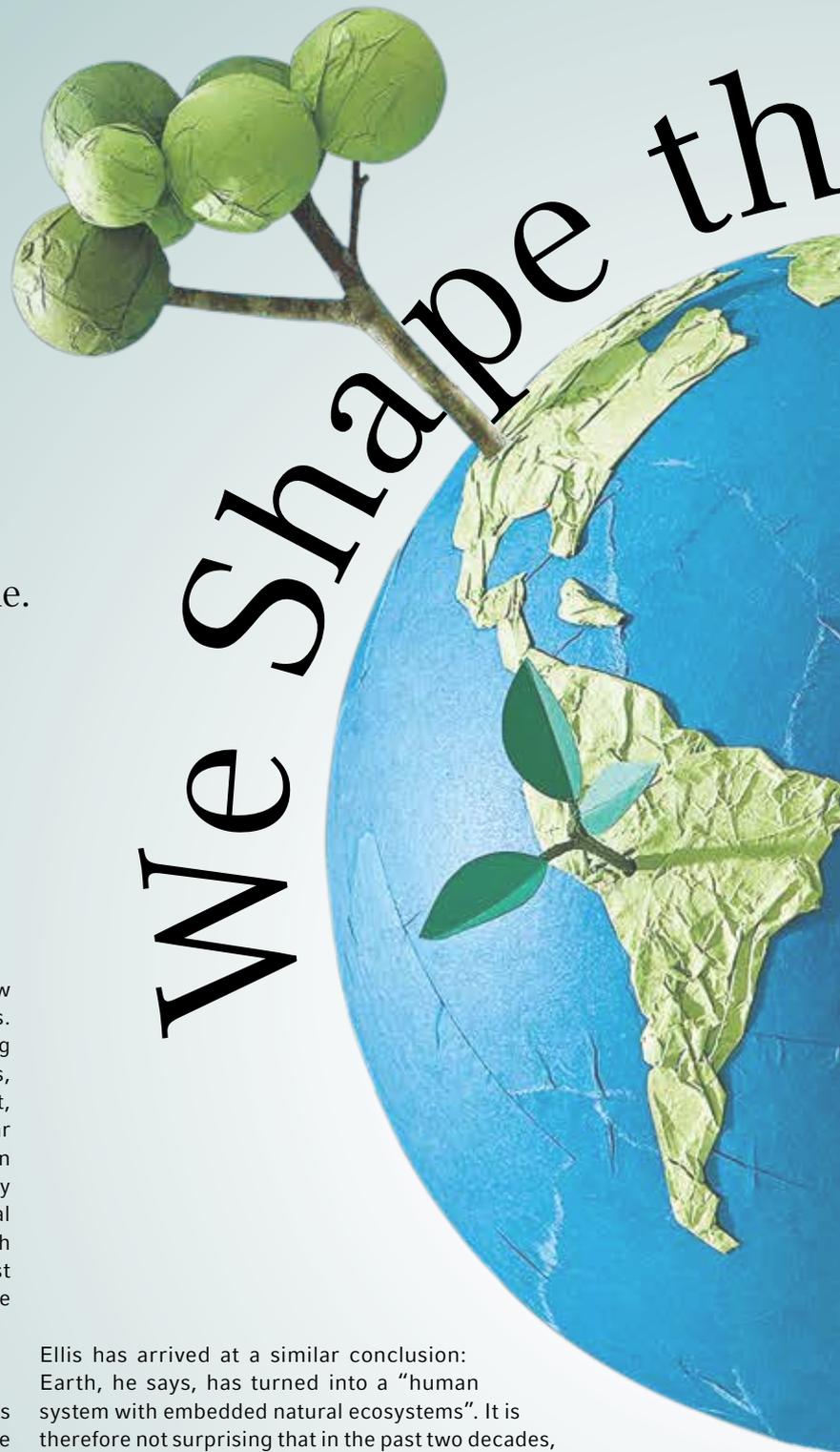
The year 1945 marked a new geological era – the Anthropocene. Scientists urge that the “Era of the Human” compels us to act in a sustainable fashion. For the sake of our planet Earth.

**T**he view from space reminds us every time: how limited and vulnerable our planet Earth really is. The atmosphere appears as a frighteningly thin, shimmering ribbon. Columns of smoke from slash-and-burn clearcuts, and gaping holes in the deep green canopy of the rain forest, are clearly visible – just like the clouds of explosions in war zones. This unique perspective made a deep impression on astronaut Matthias Maurer. When he returned to Earth in May of this year, after spending six months on the International Space Station, he said: “When one circumnavigates Earth in 90 minutes, one understands that everything is just one single unit, and that humanity must unite to assume responsibility for the planet.”

#### **Almost no intact wilderness**

The world that is presenting itself to the astronauts has undergone profound changes within the past three generations. By now, the traces of civilization are impossible to miss. Humanity has left its mark on the blue planet: vast regions have been deforested, mountains stripped, fertile soil degraded, the courses of rivers “corrected”. Earth has been pillaged for raw materials, organisms have been created that had not existed before, and even the climate has changed.

Very little unspoiled nature is left. Even in the deepest depths of the oceans, researchers come across plastic waste. According to a current study by a research group at the University of Cambridge, led by Andrew Plumtre, only 20 to 30 percent of the land mass are still considered a natural environment, and only three percent still meet the strict criteria for intact wilderness. American geographer Erle

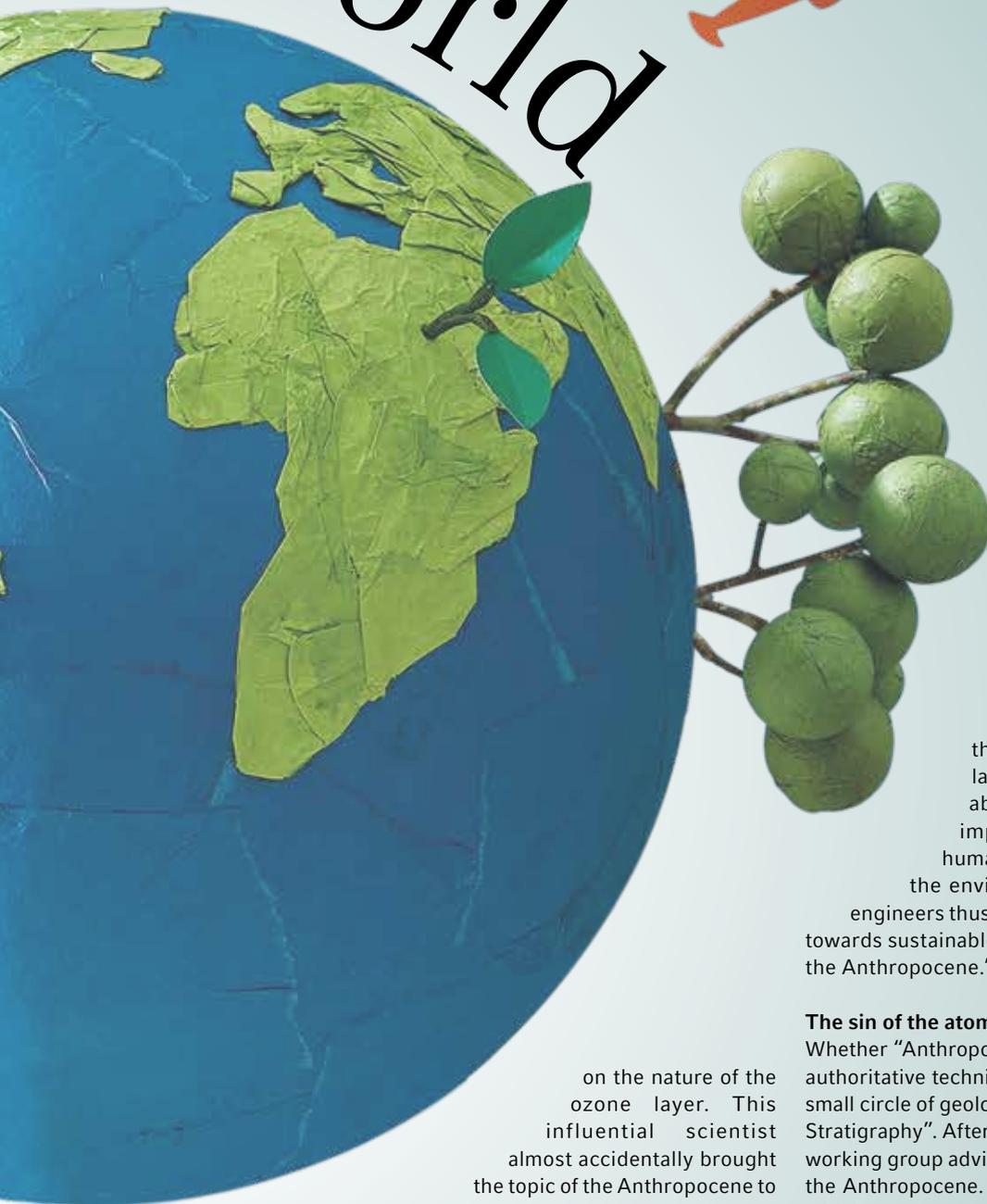


Ellis has arrived at a similar conclusion: Earth, he says, has turned into a “human system with embedded natural ecosystems”. It is therefore not surprising that in the past two decades, an initiative that had almost been forgotten has become the subject of renewed attention: the idea of proclaiming a new geological era: the “Anthropocene” – which roughly translates to “Era of the Human”.

#### **The importance of sustainable management**

As early as 1873, Italian geologist Antonio Stoppani suggested the term “Anthropozoic era” as a name for a new geological era. It is, however, only thanks to Dutch meteorologist and atmospheric chemist Paul Crutzen (1933–2021) that this idea has received broad public attention. In 1995, the director of the Max Planck Institute for Chemistry in Mainz, Germany, was awarded the Nobel Prize in Chemistry for his essential and groundbreaking research

# the World



### Growing responsibility

The Anthropocene era will be decisively shaped by human activity – with corresponding effects on the environment and climate

than the total nitrogen bound in all natural land ecosystems. His conclusion: “In the absence of a global disaster – a meteorite impact, a world war or a pandemic – humanity will become the dominant force in the environment for millennia. Scientists and engineers thus face the challenge of navigating society towards sustainable actions and management in the era of the Anthropocene.”

### The sin of the atomic bomb

Whether “Anthropocene” will indeed enter textbooks as an authoritative technical term will eventually be decided by a small circle of geologists, the “International Commission on Stratigraphy”. After years of discussion, an interdisciplinary working group advised the Commission to decide in favor of the Anthropocene. Humanity has long left indelible marks which will continue to bear witness to the current over-exploitation thousands of years from now, including chemical, plastic and aluminum residues, massive levels of extinction which had last occurred 65 million years ago, climate change, as well as radioactive substances released by atomic bomb explosions and damaged nuclear power plants. 1945, the year that the first atomic bomb was detonated in a desert in southern New Mexico, would mark the beginning of this new era.

Irrespective of the results of this decision, the term “Anthropocene” has already made a significant impact on the scientific discussion. It illustrates the fact that we humans bear the responsibility to ensure the future of our planet. ■

on the nature of the ozone layer. This influential scientist almost accidentally brought the topic of the Anthropocene to the top of the agenda: at a conference in 2000, he was an indignant as a colleague spoke of the Holocene, the current geological era which had begun at the end of the last ice age, 11,700 years ago: “Let’s stop talking about the Holocene”, he erupted, “We have long since entered the Anthropocene!” The room went silent. Later, colleagues advised Crutzen to have the term protected. Crutzen found himself forced to act and meticulously compiled his arguments.

The most critical changes, found Crutzen, included the enormous rise in the atmospheric concentrations of greenhouse gases, the sixteen-fold increase in the use of energy during the 20th century, and the fact that now, agriculture employs more nitrogen in the form of fertilizer

# Deep Green Dublin

It is after the Celtic word for green, Erin, that Ireland is named. Dublin, the friendly capital on the East coast, features many shades of green, especially in the city's many parks.



**College Park & Trinity College**  
Trinity College, located on the popular College Park, is home to the venerable Old Library. Its library space contains around five million volumes

**T**he morning sun highlights the fresh green of the well-groomed lawns of College Park in such a brilliant way that it is hard to believe that cricket teams regularly plow through it and leave their marks. Even though Ireland, an independent republic, has not been a part of the United Kingdom since 1949, this sport is enjoying continued popularity.

#### **Cultural heritage abounds with myths and legends**

There still exist many commonalities between the two British Isles of the Archipelago in Northwest Europe. Trinity College, for example, located adjacent to College Park, was founded by Queen Elizabeth I in 1592. It is known as Ireland's most prominent university, and it is reminiscent of its sisters in Oxford and Cambridge; both English institutions of higher learning can be reached from Dublin within roughly eight hours. The campus at Trinity College, the alma mater of Literature Nobel Laureate Samuel Beckett, as well as Oscar Wilde, is awash in green lawns, and College Park, along Nassau Street, is home to the Old Library.

Long before it opens its doors in the morning, visitors line up around the block. It is definitely worth it. The library's Long Room looks as though it may be straight out of Harry Potter's Hogwarts School of Witchcraft and Wizardry. Heavy, dark wooden shelves reach up to the domed ceiling. The scent of leather permeates the air. Almost five million books and manuscripts tell of ancient stories, myths and legends. A separate room has been dedicated to the Book of Kells, an illustrated manuscript dating back to the Middle Ages and UNESCO Memory of the World item since 2011.

#### **Guinness and the beauty in bronze**

It is only a 10-minute walk from the Old Library to the River Liffey, and it leads to one of the most photographed sights of the city. The Ha'penny Bridge retained ►

# LET'S GO!

Typical Ireland:  
rough and romantic

its name from the times when a toll of a halfpenny was imposed on those crossing the river on this bridge. Beneath this beautiful elliptical iron arch, the river flows slowly, and on cloudy days, the water appears so dark that Dubliners also call it the Guinness River – a reference to the Guinness beer, which has been brewed in Dublin since the mid-18th century. Its roasted barley makes it appear ruby-red inside the glass, and sometimes jet-black. In Temple Bar, an amusement quarter across the river, a number of pubs serve genuine Guinness.

## Short hair as a symbol of protest

Promenades on both sides of the river invite the visitor for a stroll. Following the river on the north side, one passes Croppies Acre Memorial Park. It is located close to the former barracks which today house the Irish National Museum. The Croppies Acre Memorial commemorates the "Croppies Boys" – those rebels who, in 1798 during an uprising against the United Kingdom, fought for an independent Ireland. These young men were known as Croppies as they wore their hair short, in solidarity with the French revolutionaries. They intended to distance themselves from the aristocrats and their powdered wigs.

A few steps ahead, visitors will discover the bronze cast of a woman lolling in a shallow basin of water. Dubliners named her "The Floozie in the Jacuzzi". The statue represents Anna Livia from the novel "Finnegans Wake" by James Joyce. According to this work, Anna Livia rose from the river Liffey as a type of goddess of rebirth and rejuvenation.

## Recharging in the green

From the bronze statue, it is not far to Phoenix Park. The Páirc an Fhionnuisce is considered one of the largest inner city green spaces – it is twice the size of New York's Central Park. In the 17th Century, members of the English Royal Family used this area to hunt fallow deer; nowadays, the atmosphere is a bit more relaxed. In the shade

In this small fishing village half an hour's drive from Dublin, the view of high cliffs, rough seas and a white lighthouse evokes a distinct Rosamunde Pilcher atmosphere. Particularly stunning: the **Cliff Walk**, a path along the coast which starts in the picturesque harbor of Howth and leads hikers along the cliffs around the peninsula on well-marked trails. The view of the light house **Baily Lighthouse** is spectacular, and from time to time, a ferry on its way to Dublin passes by.

Howth Tourist Information Centre,  
The Old Courthouse, Harbour Rd,  
Howth, Co. Dublin, Ireland

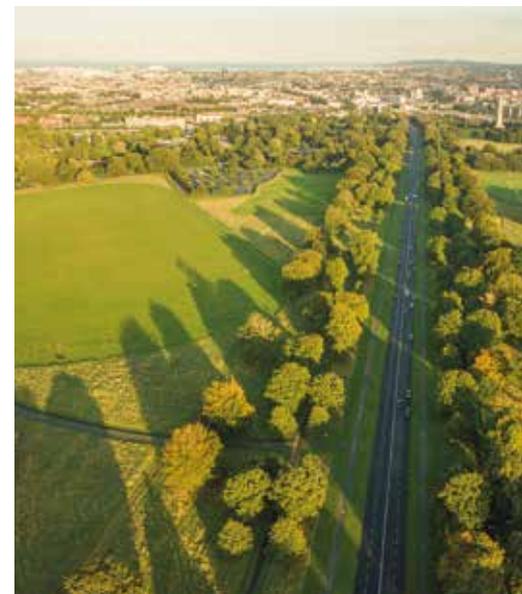


of magnolia trees, deer graze on the meticulously groomed lawns, lovers amble through the romantic Victorian flower gardens with roses, families visit the Dublin Zoo. After the zoos in Vienna, London and Paris, it is the fourth largest in the world. It is known for its species-appropriate husbandry of its roughly 400 wild animals and for the breeding of two species of cockatoo in Europe, which are threatened with extinction, as well as a primate, Goeldi's marmoset, which is equally endangered.

In the center of the vast green of Phoenix Park, visitors will come across a snow-white building featuring a portico and columns, which is strongly reminiscent of the White House in Washington, D.C.. It was designed in the middle of the 18th Century by a park ranger at the time who was also an amateur architect. Here, in the Áras an Uachtaráin, is where the President of the Republic of Ireland resides. And what's a beautiful park without a proper picnic? Scones with jam, salads and quiche from the Phoenix Café will keep Dublin-explorers happy. ■

## More green is hardly possible

Phoenix Park is twice the size of Central Park in New York – an oasis of calm in the bustling city





**Matt the Thresher, a fish restaurant** in the heart of Georgian Dublin, is only a short walk from St. Stephens Green, a park at the south end of the pedestrian zone and shopping mile Grafton Street. It has won multiple awards – among them an award for the best seafood. Michelle Obama, too, enjoyed the Carlingford oysters:

“Wonderful evening. The girls really enjoyed their seafood”, she entered into the guest book following their visit.

31–32, Pembroke Street Lower, Dublin 2, Ireland

<https://matts.ie>

Approximately 40 kilometers south of Dublin, in the Wicklow Mountains, in the midst of a green valley, lies the picturesque monastic town of Glendalough. Its cathedral is visible from afar. Glendalough was constructed in the sixth century, as an important center for early Christian education. For 500 years, the monks led a peaceful existence among the local population – until the Vikings attacked the city, and the Normans conquered it in 1398.

Glendalough Visitor Centre, Ionad Cuairteoirí Ghleann Dá Loch, Glendalough, Ireland

<https://glendalough.ie>



**Ha’penny Bridge**  
The bridge that links many Dublin landmarks



**Place to go**  
Drink real Guinness beer in the busy entertainment district of Temple Bar

**! EPPENDORF ON SITE**

Birdhill, Tipperary, outside the city of Limerick is home to Eppendorf SE wholly owned subsidiary Calibration Technology Ltd. CTL was acquired in 2016 to strengthen Eppendorf’s service presence and customer support in the UK and Ireland. CTL is accredited to ISO17025 for liquid handling calibrations, both in its dedicated laboratory and at customer sites. Tipperary and Limerick are sporting hotspots in Ireland. Limerick has been All-Ireland GAA hurling champion for the last three years, and Limerick and Tipperary have won the All-Ireland hurling championship in six of the last seven years. A visit to a GAA hurling match is highly recommended on any visit to Ireland, accompanied by an Irish coffee to warm up.

# Singing for Science

I wake up in the middle of the night and cannot fall back to sleep. I feel I've reached the lowest point in my life, with little hope that I will be able to finish my Ph.D. It has only been 8 days since I agreed to give up singing, yet it feels like an eternity. Singing had provided a welcome balance to my scientific pursuits. But after a rollercoaster year, including a switch to a new adviser and myriad family and relationship issues, my work had suffered. Something had to give. I thought it needed to be music.

About 3 years earlier, I had decided to do my Ph.D. in New York City in part for the musical opportunities. I joined the university chorus and several opera productions. Juggling my academic responsibilities and singing stretched me thin sometimes. But, after a long day of classes or hours in front of my computer screen trying to debug code, singing helped me decompress, recharge, and recalibrate.

During my second year, things started to take a turn. My original adviser left for a different institution. My new adviser was very supportive but had a much more hands-on approach than I was used to. I also needed to prepare for my qualifying exams at the end of the year. At times I considered dropping music.

"You're doing a Ph.D. in air pollution, not music," I told myself. "Priorities, priorities, priorities."

But when I remembered the joy and relaxation that I get from music-making, I rejected the idea. In fact, I took on one of the biggest, most challenging roles I've ever had: the title role in an oratorio. Preparing for the performance and my qualifying exam at the same time was a lot to manage. But every time I immersed myself in the music, I was transported away from the stresses of grad school – and when I came back, I was in better mental and emotional shape to tackle my scientific work again.

I got through my qualifying exam, but my relationship with my new adviser was still bumpy. Spending the following summer in China didn't help. My research is on air pollution and



*Mike Z. was a doctoral student at Columbia University in 2019. Today he is a Postdoctoral Fellow Environmental Medicine and Public Health at the Icahn School of Medicine in Mount Sinai*



Science  
AAAS

**i** THE SOURCE

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health in China, and most of my extended family lives there. But 3 months without face-to-face interaction with my adviser did not improve our dynamic. Miscommunications piled up. My adviser sent me an email saying that we needed to have a serious conversation when I got back. I was dreading my return – all but the music. I looked forward to rehearsing for the roles I had lined up and resuming my voice lessons.

Upon my return – on Friday the 13th, no less – my adviser and I sat down for our talk. I was not meeting expectations; my dissertation research needed to be my top priority. My adviser didn't know exactly how important music was for me and was just trying to help me be successful in my Ph.D. But I felt that giving up singing was my only choice. Maybe this would help get my doctoral work back on track. I wrote apologetic emails left and right, cutting all of my singing engagements.

The result? I was miserable. I lost the motivation to get out of bed in the morning, let alone do research. I realized that although studying pollution drives me, not being able to sing drives me mad.

So, I sent emails begging for the roles I had dropped. Amazingly, the directors all took me back. And a strange thing happened: I redoubled my

efforts, on both my research and my relationship with my adviser. We started to meet weekly, with progress reports due. These new, more frequent deadlines were very stressful, but I scheduled my voice lessons to immediately follow each meeting. I clung to music like a rope dangling over a bottomless pit.

Gradually, my adviser and I built a strong relationship, and my research finally seemed to head in the right direction. It has now been a year and a half since that fateful night. I'm making progress on my research and performing regularly. My adviser comes to some of my shows. A poster – featuring my photo – from my most recent performance is displayed on my adviser's office windowsill. The balance between music and research shifts at times – toward music in the week leading up to a performance, away as a grant due date nears – but pursuing both is my key to fulfillment. ■



# Finally Discovered!

The research vessel “Endurance”, which carried the party of British polar explorer Ernest Shackleton, had been lost for more than 100 years – until now.

**T**he wooden deck, the railing, ancient ropes and portholes, and the wheel – a century beneath the Antarctic Weddell Sea has barely touched the ship. At a depth of 3,000 meters, the research vessel “Endurance” appeared before the cameras of a diving robot, sent on its mission by the roughly 60 researchers involved in the “Endurance22 Expedition”. The ship had sunk in 1915, and since that time, multiple attempts to locate it had come up empty.

The expedition of “Endurance” began in 1914 in South Georgia. British polar explorer Ernest Shackleton and his crew set out towards Antarctica, where they encountered “the worst portion of the worst sea in the world” – the Weddell Sea. The ship eventually became trapped in the ice, and when it sank in November 1915, the crew were forced to establish camp on the ice. Shackleton wrote in his diary: “But though we have been compelled to abandon the ship, which is crushed beyond all hope of ever being righted, we are alive and well.”

The entire crew was saved after nine more grueling months. Endurance will remain in its resting place; it is protected as a historic site by the rules of the Antarctic Treaty. But thanks to spectacular videos and photos, everyone can see it for themselves.

## Before the sinking

When the research ship once got stuck in the polar ice, Ernest Shackleton’s crew had to set up camp. Later, the ship sank



## Sensational find

The Endurance lies well preserved in the depths of Antarctica – and will remain there in accordance with the current Antarctic Treaty





#### MASTHEAD

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