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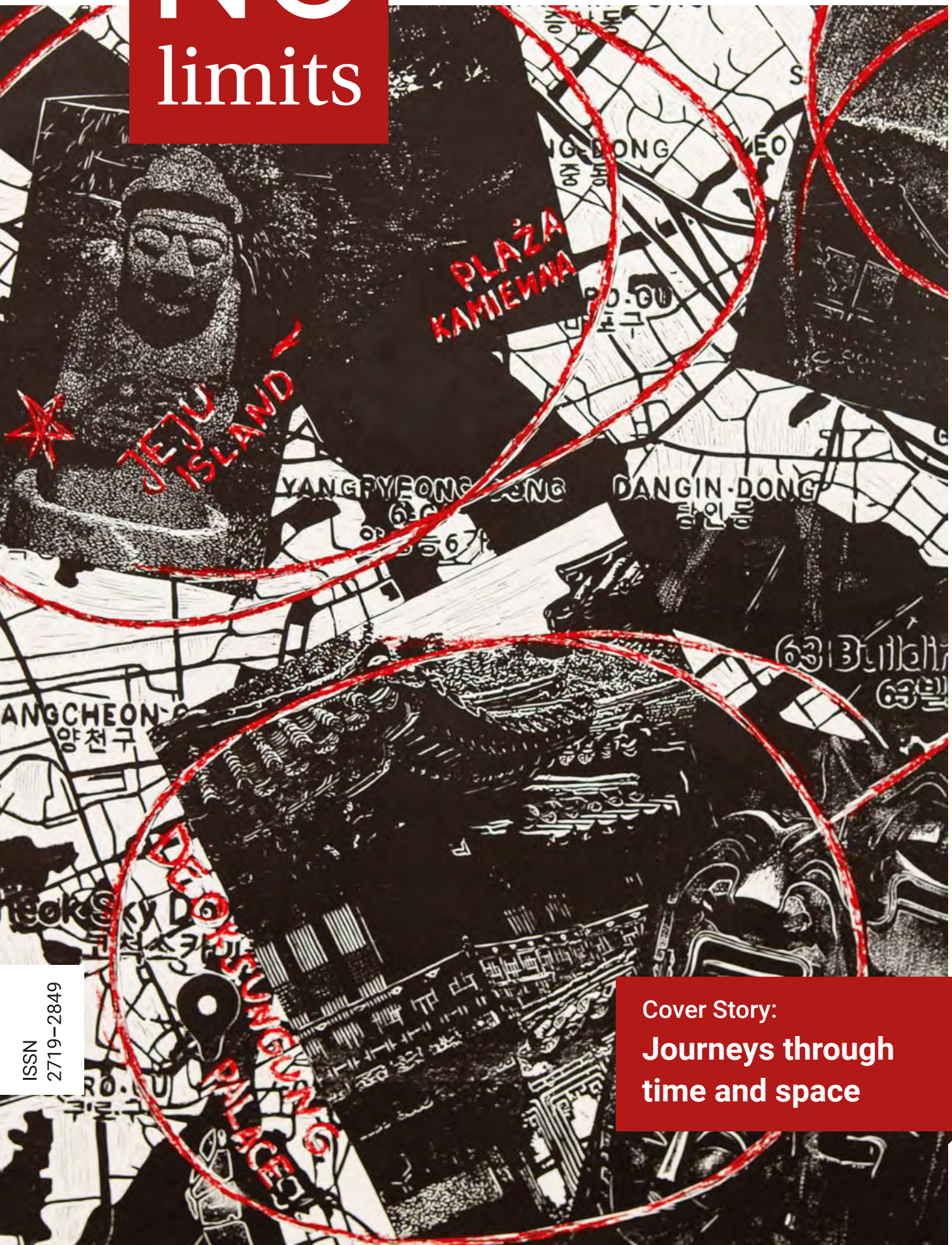

Cover Story:

Journeys through time and space

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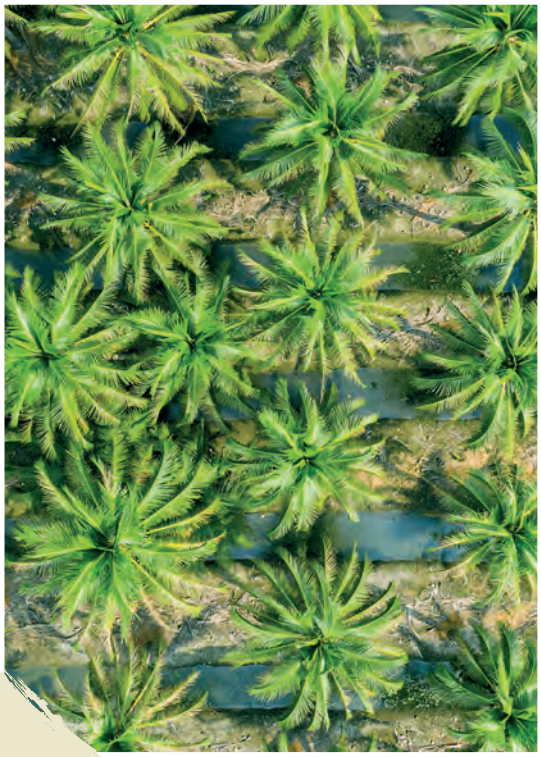
BETWEEN EUROPE AND AFRICA – SCIENCE ON THE MOVE



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Tundra on Spitsbergen | Photo: Magdalena Opała-Owczarek

Clima

RECORDED IN SHRUBS

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Climate change is mobilising crowds of scientists to search for the causes of global warming, which is destroying our planet, and the methods to slow it down. The Arctic has become a testing ground for specialists from around the world, as this is where climate change is most pronounced and begins the earliest, and is being explored by teams of highly specialised glaciologists, geographers, geologists, biologists, chemists, meteorologists, oceanographers, seismologists, and ecologists. Although their presence might be understandably surprising, dendrochronologists have also joined the group of experts. What can areas so poor in species variety offer tree researchers? Magdalena Opała-Owczarek, PhD, DSc, Assoc. Prof. – climatologist, dendroclimatologist, and palaeogeographer from the Institute of Earth Sciences of the University of Silesia dispels all doubts.

Maria Sztuka

Prof. Magdalena Opała-Owczarek has participated in numerous research expeditions and collected samples for dendroclimatological research in various parts of the world, including the Scandinavian Mountains, the Pamir Mountains, the Armenian Highlands, and northern Canada. Since 2020, she has been focusing on the Arctic: Iceland, Greenland, and Spitsbergen (National Science Center research project: 'Reconstruction of climatic conditions in the Arctic before the period of instrumental measurements on the basis of dendrochronological analysis of tundra dwarf shrubs and historical botanical collections'.

Salix polaris (polar willow), Spitsbergen | Photo: Magdalena Opała-Owczarek

JOURNEY THROUGH TIME

What can be studied in the Arctic? The Northern Hemisphere at high latitudes is primarily covered by Arctic tundra, a treeless vegetation formation consisting mainly of low creeping shrubs, mosses, and lichens. However, it turns out that the Arctic is home to prostrate shrubs, small dwarf plants with woody stems that grow in extreme climatic conditions. Although they produce very narrow growth rings, they are an excellent material that can be used as an indicator of past climate change. But there is one problem – the oldest shrubs growing today are only slightly over 100 years old. In order to reconstruct climatic conditions, a dendroclimatologist needs research material covering many hundreds of years, as it is necessary to compare contemporary specimens with those from centuries ago. Archaeological wood is also difficult to find in the Arctic, as wooden artifacts are relatively rare. The work of Magdalena Opała-Owczarek's team was significantly hampered by restrictions imposed by the COVID-19 pandemic, especially those regarding field research. The geographer then decided to look into old botanical collections and began searching through museums. Her itinerary included the Natural History Museum of Denmark, the Kew Herbarium at the Royal Botanic Gardens in London (United Kingdom), and the National Museum of Natural History in Washington, D.C. (United States). The finds vastly exceeded her expectations. The depths of museum storerooms contained some real treasures, e.g. the forgotten boxes in the Copenhagen Museum containing 150-year-old wooden discs, each with 400-500 growth rings. The researchers opened boxes that no one had ever looked into before.

'We came across fascinating materials and memorabilia collected mainly by participants of the first polar expeditions, conquerors of the North Pole, and seekers of the Northwest Passage', recalls the researcher. 'The precious collections were gathered by those searching for the British expedition of John Franklin, which went missing in 1845, and Robert Peary's expedition from 1908. It was an extraordinary discovery and invaluable research material – beautifully described and well-preserved plant specimens, fascinating herbarium cards with detailed descriptions of their locations'.

The oldest card from the polar collections in the Kew Herbarium at the Royal Botanic Gardens in London (1790) | Photo: Magdalena Opała-Owczarek

IN THE FOOTSTEPS OF VIKINGS

Thanks to the labels containing precise geographical coordinates, the researchers set course for the same places where the ancient junipers came from – Greenland. That was truly invaluable for the dendrochronologists, as it allowed them to compare samples of the same plant species collected over 100 years ago with those growing in the same location today.

'Precise analysis of the width of annual growth rings in contemporary and historical shrubs, combined with meteorological data allows us to determine past climatic conditions', explains Prof. Opała-Owczarek.

While on site, the researchers realised that they had reached the former habitats of Vikings. Their colonies lived there until the 15th century, when some of the inhabitants left the island and the rest, according to one hypothesis, were overcome by hunger and the cruel winter of 1460.

Today, dendrochronologists' knowledge goes back about five centuries. The geographer does not attempt to hide her excitement.

'We are not far off – only about 100 years – from discovering the real reasons for the Vikings' escape from Greenland'.

WHAT DO THE GROWTH RINGS REVEAL?

The rings of long-lived dwarf junipers are like a coded book; you can read a lot from them. The annual growth of wood during the tree's growing season reflects its living conditions. This unique archive contains information about the temperature in a given year, local disturbances, atmospheric circulation, and climate change. By analysing the anatomy of the wood, it is possible to infer what the climate was like at the time. Researchers focused on collecting plants, including polar willow and dwarf birch, and gathered samples from, among others: Bellsund (Spitsbergen), Abisko (Scandinavia) and Sermilik (Greenland). They also visited the Polish Polar Station Hornsund on the White Bear Bay in the southern part of Spitsbergen.

Depending on the specific climatic conditions of subsequent years, annual growth rings form sequences of varying thicknesses. When the conditions are favourable to the growth of a given species, the growth rings are wider, and in unfavourable conditions, they are narrower. This cannot be observed with the naked eye. A dwarf Arctic juniper with a diameter of no more than 5 cm (found in Iceland in May of this year) had approx. 800 rings... It is simply impossible to count them without detailed laboratory testing using a microtome and microscope.

The appearance of blue-coloured rings, whose cell walls are not fully lignified, indicates that they were formed during a severe cooling period, which may be related to volcanic eruptions. Traces of many eruptions have been found in Arctic shrubs, both those closer (e.g., Laki in southern Iceland in 1783) and those from lower latitudes (including the eruptions of Mount Parker in 1641, Tambora in 1815, and Krakatoa in 1883). The eruption of Tambora caused 1816 to be referred to as the year without a summer. The Laki eruption was so powerful that a cloud of gas and dust reached Europe. This phenomenon contributed to a decrease in the average temperature in the Northern Hemisphere by 1oC, and in Iceland itself by 5oC – this is where the Laki eruption caused the most severe natural disaster.

Why does it happen? During an eruption, huge amounts of ash, dust, and gases (including sulfur dioxide) are released into the atmosphere, forming sulfur aerosols that inhibit or even reflect some of the Sun's radiation back into space. As a result, less light reaches the Earth, causing temperatures to drop. All this can be inferred from a microscope slide with a sample taken from an 800-year-old shrub.

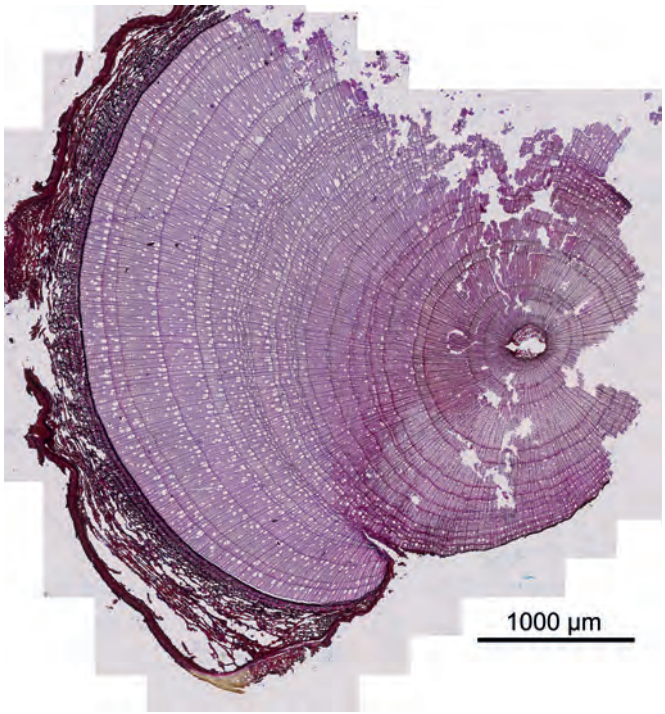
'The post-volcanic cooling was so severe that plants stopped growing normally and began to behave as if they had entered a state of dormancy, as evidenced by the blue growth and frost growth. The impact of volcanic eruptions on summer cooling allows us to assess the potential impact of future eruptions', explains the geographer.

THE PAST IN SERVICE OF THE FUTURE

Although the role of dendrochronologists was previously marginalised, the Arctic has proved to be an excellent research area for them. They can reach places with no ice and plentiful vegetation, and their work brings new and sometimes sensational discoveries. This innovative approach, which has not been used in any dendrochronological research to date, allows for accurate and reliable reconstruction of climate change over the past few centuries. A thorough understanding of past climate variability in the Arctic is important for future climate projections.

Contemporary climate models leave no room for doubt – global warming is a fact and the pace of change is still accelerating. One of the challenges of modern climatology is to find a method to separate climate variability caused by natural factors from variability associated with the growing impact of human activity. This difficult task can only be accomplished if scientists have access to a sufficiently long record of climatic conditions. Thus, the findings of Silesian dendrochronologists perfectly fit into the search for solutions to this challenge.

Heated debates about whether the current state of the climate is the result of natural changes or the effect of our civilisation's development do not solve the problem. Researchers are, therefore, leaning towards reconciling both hypotheses – human activity, which accompanies natural changes, accelerates and intensifies the course of changes that do not bode well for the Earth.



Cross-section of a polar willow shoot taken from a historical herbarium | Photo: Magdalena Opała-Owczarek

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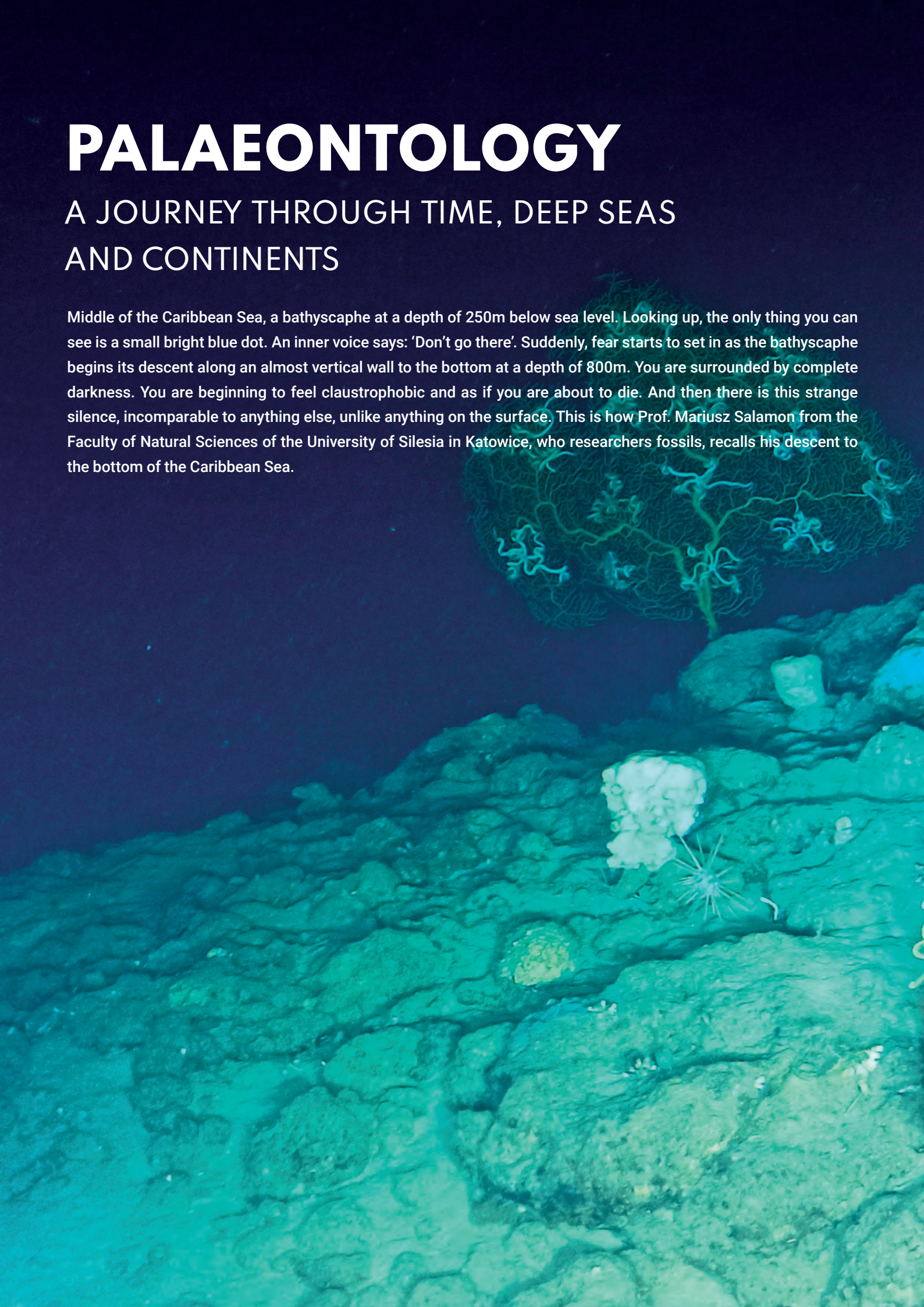
PALAEONTOLOGY

A JOURNEY THROUGH TIME, DEEP SEAS AND CONTINENTS

Middle of the Caribbean Sea, a bathyscaphe at a depth of 250m below sea level. Looking up, the only thing you can see is a small bright blue dot. An inner voice says: ‘Don’t go there’. Suddenly, fear starts to set in as the bathyscaphe begins its descent along an almost vertical wall to the bottom at a depth of 800m. You are surrounded by complete darkness. You are beginning to feel claustrophobic and as if you are about to die. And then there is this strange silence, incomparable to anything else, unlike anything on the surface. This is how Prof. Mariusz Salamon from the Faculty of Natural Sciences of the University of Silesia in Katowice, who researchers fossils, recalls his descent to the bottom of the Caribbean Sea.



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Bottom of the Caribbean Sea seen from a bathyscaphe
Photo: Mariusz Salamon

FOSSILS AS A TIME MACHINE

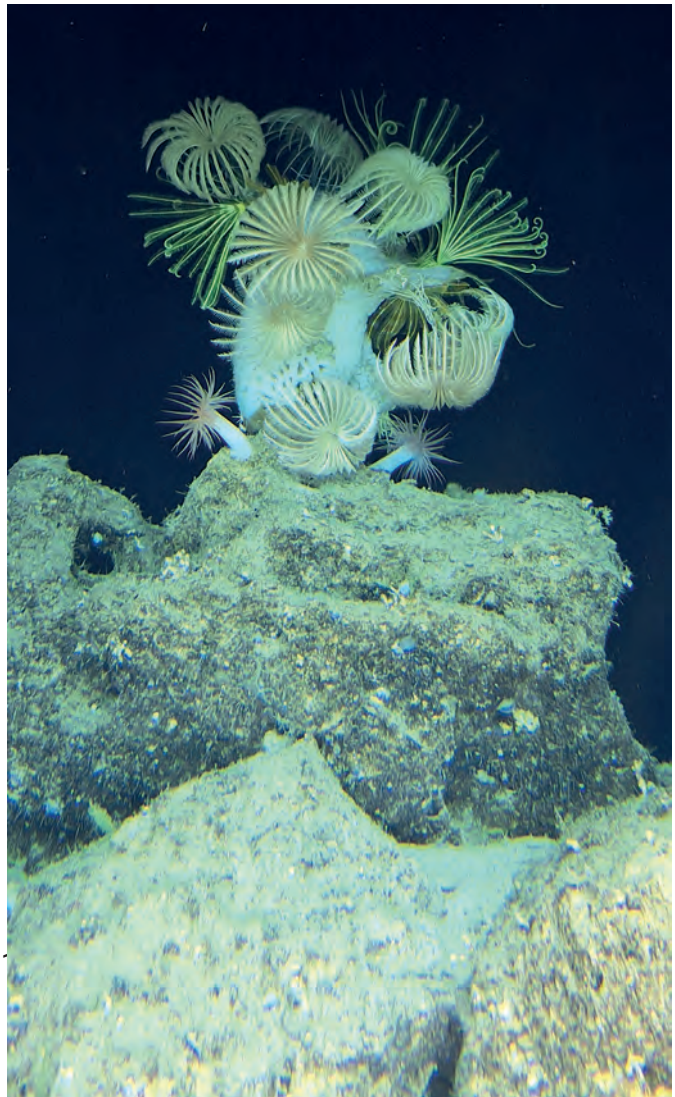
Invertebrate fossils belong to many groups – from the most primitive, including sponges and corals, through arthropods, to echinoderms, the most sophisticated in their anatomical structure. By studying them, we can learn a lot about the history of the Earth. They allow us to determine the age of rocks, and are also an excellent indicator of the palaeoenvironment. Based on various geological clues, we can determine whether their environment was a shallow or deep one.

'A specific group of organisms can help us identify certain aspects: from the age of rocks to the palaeoenvironment and temperature preferences. Fossil invertebrates are worth learning about', says the scientist from the University of Silesia.

Some ammonites are easy to identify, such as *Perisphinctes*, characteristic of the Jurassic period. Crinoids prove to be more troublesome. At the beginning of the Cretaceous period, they still lived in relatively shallow (up to 100–150m below sea level), extremely clear, food-rich, and usually very warm marine environments. These stenohaline organisms tolerate only a narrow range of salinity in water – from 31 to 33‰.

'We know that crinoids require very specific conditions to live. If any of these parameters – temperature, salinity, or water clarity – change even slightly, crinoids die. So, when we find a fossilised crinoid, we know that the place was either shallow or deep, very warm or cold, and that the water was perfectly clean', says Prof. Mariusz Salamon.

Sponge-crinoid association at the bottom of the Caribbean Sea | Photo: Mariusz Salamon



Bottom of the Caribbean Sea (Honduras) | Photo: Mariusz Salamon

FOSSIL PAPERWORK

Palaeontologists partly rely on observations of museum specimens. They contact the curator in advance, who then prepares the collection so that the scientists can take proper measurements, photograph the specimens, and e.g. determine the condition of the crinoids. The researcher admits that working in a museum is quite tedious and he definitely prefers fieldwork. The scientists usually rely on the services of a guide who explain the local geology to them, as was the case in Algeria, Morocco, and Chile.

'In the field, you just have to lie down and examine the ground centimeter by centimeter to see whether there are any fossils. Unfortunately, usually we do not find anything and are forced to move on. In Morocco, we found a lot of crinoid fossils, which often were visible enough that we didn't have to put our faces against the rocks. Then we'd take a brush and a hammer, chip everything out, pack it into bags, and describe it in detail', says the researcher.

Scientists are not always able to transport the fossils they find to Poland. Depending on the country, the process can be more or less complicated. Currently, Prof. Salomon is waiting for crinoid specimens from Mexico; in this case, obtaining the necessary permits requires ministerial approval. However, specimens found in Chile cannot be transported to Poland at all – scientists have to make do with photographs taken during their research.

'I am building a huge database, and while in many cases photographs are sufficient, for some projects specimens are essential. This was the case, for example, with a project on North Africa. A monograph was then published on crinoids of the southern shelf of the Tethys where the famous prehistoric ocean was located. Reviewers and editors of the leading journals believe that if specimens were found in, e.g. Algeria or Egypt, they should be returned there. I always send specimens back to their countries of origin', says the researcher.

SCIENCE VERIFIES ITSELF

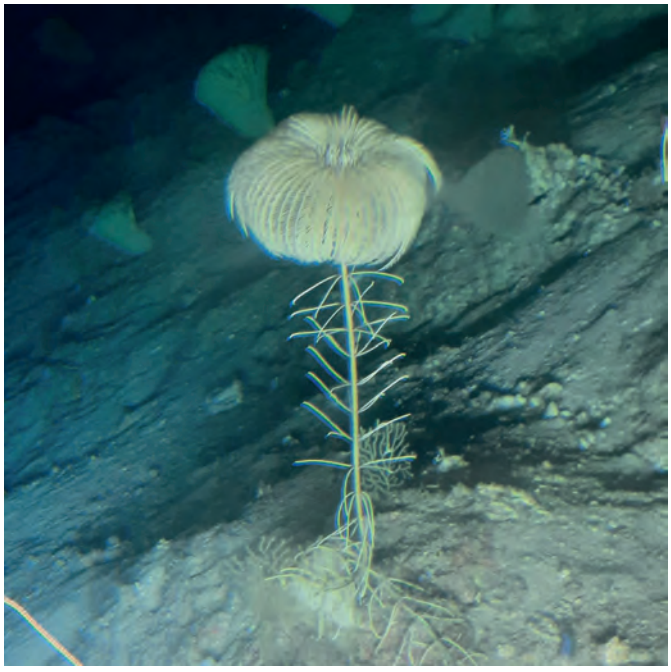
Prof. Mariusz Salamon has conducted research in many parts of the world. He has searched for crinoids in Chile, Mexico, Romania, and at the bottom of the Caribbean Sea. It was in the latter place that several of his scientific dogmas, guiding him thus far, collapsed. The scientist emphasises that in palaeontological research, uniformitarianism is of utmost importance. The first dogma concerned the photic zone, i.e. the place reachable by sunlight. Descending to the bottom in a bathyscaphe allowed him to see that this depth in the Caribbean Sea is much greater than the standard 250m below sea level. The second dogma concerned stemless crinoids.

'Based on data from the 1980s and 1990s, I always claimed that they were an indicator of extremely shallow environments. However, while 800m underwater, I saw a rock occupied exclusively by stemless crinoids. But that's not all. When we began to surface and were at a depth of 300–150m, stalked crinoids, known as cyrtocrinids, appeared. In this case, previous scientific research suggested that they were an indicator of extremely deep marine environments. It turned out to be completely the opposite', admits the palaeontologist.

Crinoids changed their habitats in an attempt to protect themselves from predators, and their biggest predators were not fish but their sister group.

'Sea urchins, which belong to the Echinodermata, have five teeth with which they can grab the crinoid's side appendage and suck it in like spaghetti', explains the scientist.

Scientists discovered a fossil in a flat area – a dozen or so stem crinoids surrounded by several dozen sea urchins approaching them. In order to defend themselves against predators, the crinoids slowly began to descend to greater depths. In the Triassic period, they lived relatively close to the surface, but by the beginning of the Mesozoic era, they had already moved deeper down. Today, they live completely outside the photic zone. In this way, crinoids changed their living environment.



Bottom of the Caribbean Sea (Honduras) | Photo: Mariusz Salamon

Fossil of a stemless crinoid from the Cretaceous period (Australia) | Photo: Mariusz Salamon

SCIENTIFIC ADVENTURE IN THE FIELD

The researcher recalls that at the beginning of his scientific work, he was happy with every little thing that he could find in Poland, but now he searches for specimens all over the world. He has studied fossils from Slovakia, the Czech Republic, Germany, France, Italy, India, Madagascar, Ethiopia, Kenya, Chile, and Australia, among other places. He has participated in many scientific expeditions. Crinoids are often found in mountain ranges, quarries, and mines. One such place is Atacama, the highest desert on Earth, located in Chile.

'Our research station was quite close, but the conditions were difficult due to the altitude, even despite acclimatisation. It was an incredible amount of effort that showed me how important acclimatisation camps are for those who want to conquer the Seven Summits. There, we found a well-preserved crinoid. During the expedition, we were caught in a storm at an altitude of almost 5,000m above sea level, and I also saw the highest geysers in the southern hemisphere. The Valley of the Moon made a big impression on me – its red rocks are reminiscent of the surface of Mars. Nights in Atacama are incredible, you can see the stars and planets with perfect clarity. No photos can capture the view in its full glory. There is no hard surface, only gravel and llamas all around – they approach the cars unconcerned by the presence of humans', says Prof. Mariusz Salamon.

The scientist has more ideas for research. Among other things, he is preparing a project on crinoids from the Permian-Triassic period. It was a moment in history when one of the five great mass extinctions occurred. It was the largest in terms of scale – 95% of marine species became extinct. Crinoids were decimated and underwent a complete transformation. For a long time, people believed that, following the extinction, only one group of crinoids remained. It wasn't until much later that Prof. Mariusz Salamon stumbled upon materials from Spitsbergen, Montenegro, and Slovenia which proved that other groups of crinoids from the period survived as well.

The palaeontologist emphasises that each expedition is different and unique. He is currently studying fossils from Romania and Mexico, and planning a field trip to Japan. His biggest dream is to visit Tasmania, because of its Permian rocks, and the North Island of New Zealand.

'I would like to visit the sites that show great promise in terms of a huge number of crinoids, and New Zealand is basically a tabula rasa that I hope to discover', concludes Prof. Mariusz Salamon.

A JOURNEY IN SERVI

The dusk is falling. The cacophony of sounds intensifies in the dense primary tropical rainforest. As we approach the muddy path to the jungle's edge, we encounter a wall of sound. Every now and then, the wheezing and buzzing sounds of thousands of species of crickets, cicadas, hundreds of species of frogs and other creatures that have found their home in Borneo break through. Together they create an unsettling noise that, combined with the impenetrable darkness of the greenery, the stale air, and the suffocating dampness, fills you with a kind of ancient fear. This landscape, however, is slowly disappearing. As mass clearance of the tropical forest continues, replaced by the ever expanding areas of oil palm plantations, more plant and animal species are being lost in a place that is still among the most biodiverse on Earth.

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CE OF BIODIVERSITY

Oil palm monoculture – the main cause of tropical forest destruction in Borneo | Photo: tawatchai07 – Freepik.com

WHEN WE DESTROY

The biodiversity map of the world is losing more and more species... Although we feel that this is a bad sign, it is difficult for us laypeople to grasp the full scale of the problem.

'Many years ago, a colleague of mine, Łukasz Junkiert, PhD, compared forest biodiversity to a blood test. The blood remains red, even in the cases of iron, vitamin D, or haemoglobin deficiency. We know how fatal the loss of just one of those would be to our health. The same is true of nature. So, why are we indifferent to the extinction of thousands of plant and animal species?', asks Marcin Walczak, PhD Eng, an entomologist from the University of Silesia in Katowice.

The scientist stresses that, at first glance, it is difficult to see the loss of biodiversity in the world. The richest in species and unfortunately also the most fragile ecosystems are tropical forests. They are easily destroyed.

'This is hard to explain to the tourists returning from resorts in Zanzibar or Bali, who are enthralled by artificially planted palm trees. Unfortunately, almost 95% of the tropical forests on these "paradise islands" have already been cut down, and yet tourists return from their trips delighted and blissfully unaware that what they saw were nothing more than plantations of imported trees. This artificial greenery has replaced the once rich and original nature. They look, but they don't see that nature is dying', he adds.

The scientist's day-to-day work involves the study of Auchenorrhyncha, insects belonging to the Hemiptera, a poorly studied group whose only representatives known to the general public are the cicadas. In search of unknown species, he went on a research trip to Borneo.

'We are currently describing two new species of Auchenorrhyncha of the genus *Andes*, native to this beautiful island', he stresses.

He was inspired by the work of Frederick Arthur Godfrey Muir, an English entomologist who wrote about and illustrated 15 species from Borneo exactly 100 years ago.

'Hand-drawn sketches of male copulatory organs allowed me to distinguish new species. However, Muir did not illustrate females, as they are more difficult to distinguish. These days, we can make use of genetics and scanning microscopes, so it is important that I get to his collection now located in a museum in Honolulu. I could take samples and digitise all the specimens. Without it, I won't be able to process the rest of the collection', says Marcin Walczak.

The entomologist points out that even such small, inconspicuous insects as true bugs have a big role to play in the ecosystem.

'Large-scale clearing of the jungle in Borneo is having a catastrophic impact on these and millions of other animal and plant species', he stresses.

Borneo is an Asian island bordered by Indonesia, Malaysia, and Brunei. It is the third largest island in the world, with an area more than twice the size of Poland. It is also one of the most biologically diverse places on Earth.

Unfortunately, human activity is causing the forests of Borneo to disappear right before our very eyes. This is the result of deforestation – the mass clearing of primary tropical forests to make way for expanding oil palm plantations. Palm oil produced in this way is commonly used by both the food and cosmetics industries. Indonesia is the largest producer, and the main consumers are the American, Chinese and, of course, European markets. However, it is worth noting that in 2023, the European Union introduced restrictions on palm oil imports due to the negative impact of its production on the environment.

On the one hand, we have a wealth of nature that is incomparable to anything else, and on the other, there are monocultures, which by their very definition contradict any notion of diversity.

'To illustrate what I mean, let's take a moment to imagine a tropical forest, which I had the opportunity to see up close during one of my scientific expeditions', says the entomologist. 'In Poland, we have three species of cicadas. We associate their pleasant sound with the beginning of summer. The further south you go in Europe, the greater the number of species found there and the more intense the sounds they make', says the scientist.

Borneo offers a completely different experience.

'As darkness falls, the cacophony of sounds in the jungle intensifies. The sounds heard around you are more like the clatter of machines or jackhammers. Drilling is interspersed with buzzing and sawing. They all sound really strange and end up merging into a uniform wall of sound... And yet I recognised them recently when I turned on a programme about tropical forests on the National Geographic channel. When I heard the sounds of the jungle, I knew that in just a moment the narrator would say that it was Borneo. The heartbeat of this primeval forest is permanently etched in my memory', adds the entomologist.

This is a truly unique, sense-based proof of biodiversity.

Borneo is the third largest island in the world, with an area more than twice the size of Poland | Photo: Łukasz Junkiert

Large-scale deforestation in Borneo has a devastating impact on the animal and plant species living there | Photo: Łukasz Junkiert

WHEN WE ATTEMPT TO PRESERVE

When we learn about the effects of human activity, it is difficult not to get the impression that not only does nature not need us, but our presence is actually harmful to it. It seems to function best in places not yet reached by humans. Borneo serves as a clear example. The problem of the huge number of oil palm plantations is not only linked to the loss of biodiversity, but also poses a threat of huge forest fires, soil erosion, river drying, and watercourse pollution. Excessive deforestation is to be limited in national parks and nature reserves. But are these restrictions effective?

'Imagine reserves – these "jungle islands" in a sea of oil palm plantations. They are effectively isolated micro-ecosystems, separated from each other by hundreds of kilometres', says the scientist from the University of Silesia in Katowice.

Although they provide shelter for plant and animal species, they are ultimately too small to truly save the island's biodiversity. For isolated small populations of plant and animal species, the only chance of survival is through the so-called wildlife corridors, which are strips of natural vegetation usually running along watercourses, forming a route connecting individual protected areas.

'They are very important because the lack of contact with other populations carries the risk of inbreeding, i.e. reproduction within a small group', says the researcher.

One solution would, therefore, be to leave strips of natural vegetation connecting the reserves and to look after the forests outside the protected areas. The policies adopted by palm oil-consuming countries are also important.

The earlier-mentioned European Union decision to restrict imports of this raw material could be an example of an effective action. It is also up to us to consciously avoid food products and cosmetics containing palm oil.

Scientists are also analysing the possibility of restoring tropical forests.

'It is theoretically possible. However, we know that imitating nature has always been an uphill struggle for us', says the scientist.

'There are an average of 300 tree species per hectare in Borneo. For comparison, Poland has only 60 in total. A major problem is the monocultures planted in our country, which I call "single-species pseudo-forests". Although this solution makes the work of foresters easier and allows them to obtain specific tree species that are valuable to industry, it has disastrous consequences for biodiversity. A real forest has a variety of plant species, rich undergrowth, and a multi-layered structure. It is a place where old, dead and decaying trees also play an important role', emphasises the scientist.

How then can we even begin to imagine the restoration of forests in Borneo, a place with 50 times more tree species?

'Only nature can do it, but it will take many thousands of years,' concludes the entomologist.

Migrations

that shaped Old English literature

It is the middle of the 5th century AD. The Migration Period is at its peak – barbarian tribes are moving towards southern and western Europe. Groups of Germanic peoples inhabiting what is now Denmark, northern Germany, and eastern Netherlands – the Jutes, Angles and Saxons – cross the North Sea and invade the British Isles, pushing the Celtic Britons to Cornwall and Wales. Contrary to their barbarian origins, the invaders brought with them sophisticated material culture, beliefs (similar to Nordic ones) and orature – spoken literature, which would later become the basis of Old English (pre-Norman) literature.

Fragment of the Bayeux Tapestry depicting the death of the English king Harold II at the Battle of Hastings (1066), won by the armies of the Duchy of Normandy led by William the Conqueror. The Norman conquest of England ended the Old English period in history and literature | Photo: public domain (Wikipedia Commons)

Tomasz Płosa

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Page from the *Lindisfarne Gospels*, an illuminated manuscript from the early 8th century. The book stands out thanks to its rich ornamentation, which intertwines Irish, Germanic, Celtic, Pictish, Latin, Arabic, and Byzantine motifs. The *Lindisfarne Gospels* is a perfect example of the cultural sophistication of Northumbria in the early Middle Ages
Photo: public domain (Wikipedia Commons)

Old English texts were created after the period of Christianisation, during the so-called Heptarchy (seven Anglo-Saxon kingdoms), i.e. from the end of the 7th century. The heyday of Old English literature came in the 10th and 11th centuries. 'The Old English literature is quite unique because nowhere else in Europe have so many and such diverse works been written in the vernacular, i.e. in the everyday language used in day-to-day communication, and therefore understandable to every member of the Anglo-Saxon community. In this respect, it can only be rivalled by Nordic literature written between the 12th and 14th centuries', notes Rafał Borysławski, PhD, DLitt, Associate Professor, who researches Old English literature at the Institute of Literary Studies at the Faculty of Humanities of the University of Silesia in Katowice.

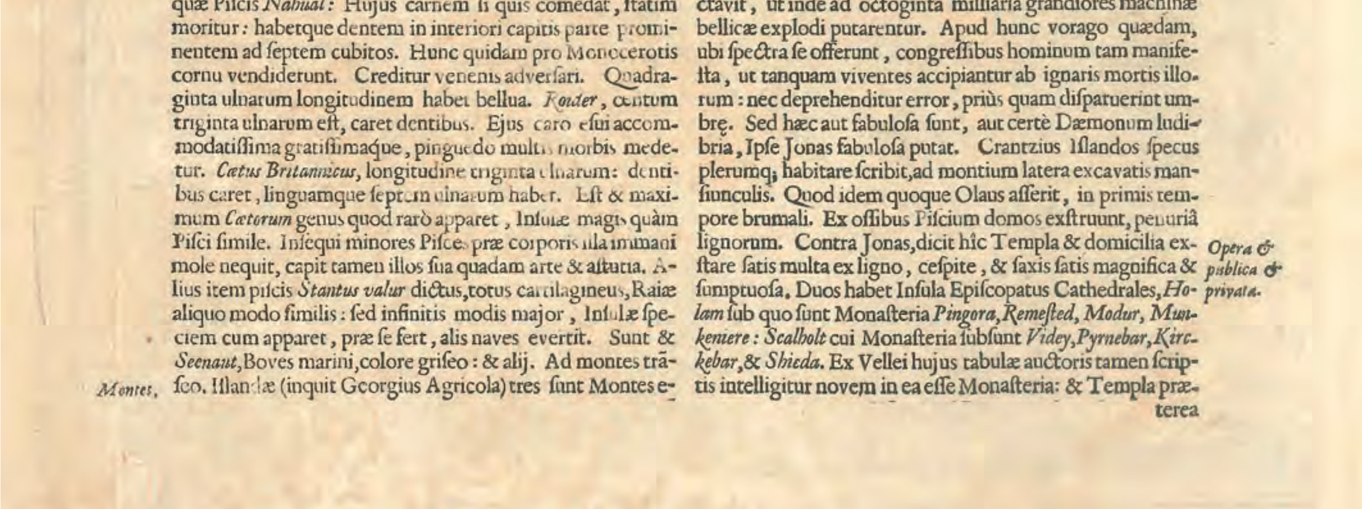
Ironically, such wealth of Old English texts (which, incidentally, is grammatically and lexically very different from modern English) would not exist if it hadn't been for the Viking invasions. In the year 793, described in the *Anglo-Saxon Chronicle* as a year of famine, epidemics, and the appearance of 'fiery dragons', ships carrying Scandinavian warriors reached the British coast for the first time, arriving at the holy island of Lindisfarne. While there, the Vikings plundered and destroyed the local Benedictine monastery. Their raids continued throughout most of the 9th century, and in 865, the so-called Great Heathen Army (Old English: *mycel hæþen here*) landed in the British Isles, and kept ravaging the Anglo-Saxon kingdoms for the next 13 years. The Viking conquest was only brought to an end by the victory of Alfred the Great, King of Wessex, at the Battle of Edington.

It was Alfred (c. 849–899), reigning since 871, who decided that the only chance to save the Western European cultural heritage was to familiarise all his subjects with this tradition, including those from the lower social classes. Latin was not particularly suitable for this purpose (most of its speakers had fallen victim to the Scandinavian aggressors), so the everyday language remained the only viable option. This marked the beginning of a great translation campaign, which included *Confessions* by Augustine of Hippo and *On the Consolation of Philosophy* by Boethius. Original works in Old English were also being produced on a large scale, including religious texts (sermons, lives of saints), philosophical and existential works, love poetry, wisdom literature, and heroic poems, the most famous of which is Beowulf, an extremely important source of inspiration for J.R.R. Tolkien. Dating back to the times before the Germanic settlement in Great Britain, the story of the hero fighting the monster Grendel, his terrifying mother and a dragon can be traced to a manuscript from the turn of the 10th and 11th centuries. It is a prime example of the migration of literature along with people – in this case, the Germanic ancestors of the English nation.

'Usually, students first learn about *Beowulf*, but personally, I would rather recommend elegiac and existential poems, especially *The Seafarer* and *The Wanderer*, as an introduction to Old English literature', says Prof. Borysławski. 'I myself was once completely captivated by these works, which compare the human fate marked by suffering, sadness, loneliness and the ultimate loss of everything to a journey across the sea that nevertheless offers hope. This element is depicted very vividly; while reading, you can almost feel the cold, dampness, and saltiness of the sea water'.

For the literary scholar from the University of Silesia, very important are also the poems that are riddles – often with two (or more) completely different solutions – and wisdom literature bordering on philosophy and theology of life. Recently, Prof. Borysławski has been analysing Old English texts for the motif of fear and proposing new interpretations of works contained, among others, in the *Exeter Book*.

'It is precisely the elegiac and existential poems, riddles and wisdom literature, characterised by a certain enigmatic nature, that I consider to be the three main paths to the extraordinary aesthetics, mentality, and sensitivity of the people of that time. The Middle Ages were not dark ages! And if a contemporary reader would like to seek inspiration in this literature that goes back as far as 14 centuries, I would point out that Old English works seek to inspire us to marvel at the world and recognise it as an eternal mystery. We want to know the essence of God's plan, but as humans we are ultimately limited in this capacity. However, the awareness of these limitations is in itself a success!', concludes Prof. Borysławski.



quæ Piscis *Nahual:* Hujus carnem si quis comedat, statim moritur: habetque dentem in interiori capitis parte prominentem ad septem cubitos. Hunc quidam pro Monocerotis cornu vendiderunt. Creditur venenis adversari. Quadraginta ulnarum longitudinem habet bellua. *Roider*, centum triginta ulnarum est, caret dentibus. Ejus caro esui accommodatissima gratissimaque, pinguedo multis morbis medetur. *Cætus Britannicus*, longitudine triginta ulnarum: dentibus caret, linguamque septem ulnarum habet. Est & maximum *Cætorum* genus quod rarò apparet, Insulæ magis quàm Pisci simile. Insequi minores Pisces præ corporis illa immani mole nequit, capit tamen illos sua quadam arte & astutia. Alius item piscis *Stantus valur* dictus, totus cartilagineus, Raiæ aliquo modo similis: sed infinitis modis major, Insulæ speciem cum apparet, præ se fert, alis naves evertit. Sunt & *Seenaut*, Boves marini, colore griseo: & alij. Ad montes trāseo. Islandæ (inquit Georgius Agricola) tres sunt Montes e-

Montes.

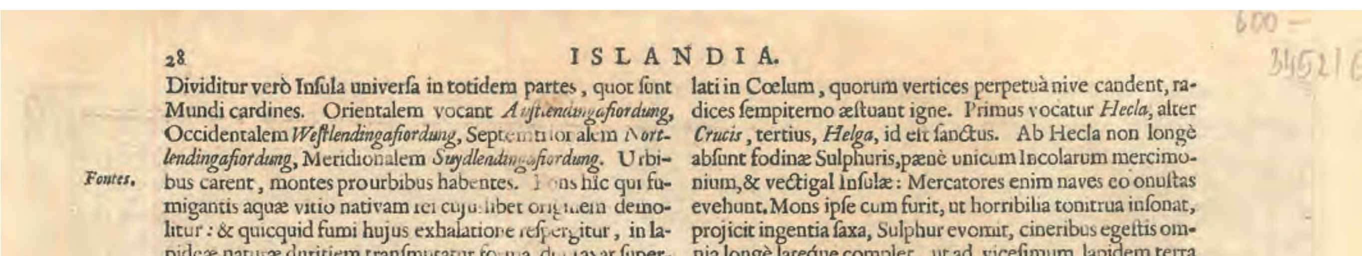
ctavit, ut inde ad octoginta milliaria grandiores machinæ bellicæ explodi putarentur. Apud hunc vorago quædam, ubi spectra se offerunt, congressibus hominum tam manifesta, ut tanquam viventes accipiantur ab ignaris mortis illorum: nec deprehenditur error, priùs quàm disparuerint umbræ. Sed hæc aut fabulosa sunt, aut certè Dæmonum ludibria, Ipse Jonas fabulosa putat. Crantzius Islandos specus plerumq; habitare scribit, ad montium latera excavatis mansiunculis. Quod idem quoque Olaus asserit, in primis tempore brumali. Ex ossibus Piscium domos exstruunt, penuriâ lignorum. Contra Jonas, dicit hic Templa & domicilia exstare satis multa ex ligno, cespite, & saxis satis magnifica & sumptuosa. Duos habet Insula Episcopatus Cathedrales, *Holam* sub quo sunt Monasteria *Pingora, Remested, Modur, Munkeniere: Scalholt* cui Monasteria subsunt *Videy, Pyrnebar, Kirckebar*, & *Shieda*. Ex Vellei hujus tabulæ auctoris tamen scriptis intelligitur novem in ea esse Monasteria: & Templa præterea

Opera & publica & privata.

Daniel Vetter

IN THE LAND OF ICE AND FIRE

Map of Iceland by Petrus Kaerius from 1630. Private collection of Dariusz Rott



28 ISLANDIA.

Dividitur verò Insula universa in totidem partes, quot sunt Mundi cardines. Orientalem vocant *Austlendingafiordung*, Occidentalem *Westlendingafiordung*, Septentrionalem *Nortlendingafiordung*, Meridionalem *Suydlendingafiordung*. Urbibus carent, montes pro urbibus habentes. Fons hic qui fumigantis aquæ vitio nativam rei cujuslibet originem demolitur: & quicquid fumi hujus exhalatione respergitur, in lapideæ naturæ duritiem transmutatur forma

Fontes.

lati in Cœlum, quorum vertices perpetuâ nive candent, radices sempiterno æstuant igne. Primus vocatur *Hecla*, alter *Crucis*, tertius, *Helga*, id est sanctus. Ab Hecla non longè absunt fodinæ Sulphuris, pænè unicum Incolarum mercimonium, & vectigal Insulæ: Mercatores enim naves eo onustas evehunt. Mons ipse cum furit, ut horribilia tonitrua insonat, projicit ingentia saxa, Sulphur evomit, cineribus egestis omnia longè latéque complet

For a 17th-century European, Iceland must have been an almost mythical island – a land of smoking volcanoes and icy winds surrounded by a hostile ocean full of fantastic beasts and sea wonders. It was the destination of Daniel Vetter, a young member of the Unity of the Brethren and a well-educated humanist and future printer, who reached the island in 1613. He recorded his observations from his several-week stay in one of the most intriguing travel works of Old Polish literature – *Islandia álbo Krotkie opisanie Wyspy Islandyji (Iceland, or a Short Description of the Island of Iceland).*

Adam Bała

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This inconspicuous work, first published in 1638 by Vetter's own printing house, remained forgotten for a long time, existing only in specialist reprints. It was only thanks to the research of Prof. Dariusz Rott, a literary historian, media expert and editor, author of, among others, the book *Daniel Vetter i jego „Opisanie wyspy Islandyji" (Daniel Vetter and his Description of the Island of Iceland)* of 1993, that it was rediscovered, edited, and made available to contemporary readers in an understandable form.

'When Daniel Vetter arrived in Iceland in 1613, he may have been a bit surprised, although I do not think that anything particularly shocked him', explains Prof. Dariusz Rott. 'He was, after all, a well-educated man – he studied at German secondary schools and at the Heidelberg University. During his studies, he had to gather information about this distant corner of Europe. He most likely had access to contemporary atlases, in which Iceland was presented in a highly fantastical way. And this is how he had imagined it'. Iceland, this 'land of fire and ice', which for Europeans was a borderland where the known world ended and something completely different began, became an area of research for Vetter. Contrary to the stereotypical image of a traveller of that time as a collector of anecdotes and fantasies, the future printer from Leszno proved to be a perceptive and critical observer. The researcher emphasises his modern approach to writing:

'Vetter does not build his accounts in a linear fashion (journey – stay – return) but thematically. Each chapter is devoted to a different aspect of life on the island: geography, flora and fauna, religion, customs, climate. Thus, we can find separate sections devoted, for example, to roads in Iceland, water, the organisation of day and night, and, what's particularly interesting, religious services.

As a representative of the Protestant community, Vetter met with the bishop in Skalholt and took part in the deliberations of the Althing, one of the oldest parliaments in Europe. His account of these events is an invaluable testimony to Icelandic culture from over 400 years ago.

Importantly, Vetter does not take everything at face value. When he hears stories about damned souls whose cries are said to resound from the Icelandic mountains, he writes: 'I was there – I saw nothing of the sort, I heard nothing'. This rational approach means that the text does not succumb to sensationalism, but rather resembles a modern travel report in which the author verifies preconceptions and stereotypes about this specific region of the world.

But who was Daniel Vetter himself? As the literary scholar reminds us, the author *of Iceland, or a Short Description of the Island of Iceland* came from a family with deep traditions in the humanities. His father was a printer and translator of the so-called Kralice Bible – the first complete translation of the Bible into Czech. In the 1630s, he settled in Leszno, a notable town which was the centre of Czech Protestant emigration and one of the most important centres of Reformation culture in the Polish-Lithuanian Commonwealth. There he managed the printing house, which produced the works of Jan Amos Komeński and other Protestant thinkers. Vetter himself was friends with Komeński, who was godfather to his eldest son.

The motives behind Vetter's trip to Iceland remain a subject of speculation to this day. Was it part of a classic educational journey? Or perhaps a religious mission – an attempt to establish contacts between Protestant communities? Or was he simply attracted by the exotic and the desire to face the unknown? Whatever the case may have been, the account he left behind has grown to be considered the most outstanding text written about Iceland by a foreigner in the 17th century – a fact proudly noted by the Icelanders themselves, when they published a modern translation of the work.

Today, Vetter lives on – not only in the research of Professor Dariusz Rott but also as a source of inspiration. His life and work influenced, among others, Piotr Milewski, author of the book *Iceland or The Coldest Summer in 50 Years*, who used excerpts from Vetter's account as chapter mottos. A bibliophile edition of Vetter's work has also been published, enriched with woodblock prints from *A Description of the Northern Peoples* by Olaus Magnus, graphically illustrating the world described by the 17th-century author. It was published by the Museum of Polar Research in Puławy.

Thanks to the work of the Polish studies expert from the University of Silesia, Vetter has gained a new life – not only as an object of interest for researchers of Old Polish literature but as a genuine cultural figure. Meet-the-author sessions with the writers inspired by Vetter, radio broadcasts, bibliophile editions and even mentions in tourist guides have ensured that Vetter's name has not been forgotten, and his work continues to encourage readers to head north, seeking not only ice, fire, and 'sea wonders' but also fascinating culture and history.

Curiosity and courage

WOMEN'S JOURNEYS TO THE ORIENT

Julia Galas

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Gertrude Bell with Winston Churchill on her right and T.E. Lawrence on her left during a conference in Cairo on 20 March 1921 | Photo: George M. Georgoulas / Newcastle University Library, public domain (Wikimedia Commons)

These days, we can name many famous female travellers who reach the farthest corners of the globe – they traverse deserts and tropical forests, explore the ocean depths, and conquer mountain peaks. They bring us closer to different cultures, the customs of indigenous peoples, and the beauty of the natural world, and their travel accounts inspire future generations of women, showing them that anything is possible. This unique group includes Anna Neumanowa, Helena Szolc-Rogozińska, and Ewa Dzieduszycka. Although there is still much to be done in terms of inclusivity and gender equality, it is much easier for women to travel today than it was a few centuries ago.

'There is no denying that women have always played a role in shaping the world', says Julia Szołtysek, PhD from the Faculty of Humanities of the University of Silesia, who specialises in travel literature. 'Their activities flourished in all spheres of life, science, and culture. However, women's achievements were not publicised for quite a long time, and were even appropriated by men to whom they were subordinate as wives, daughters, or sisters', adds the researcher.

Traditionally, women were considered to belong solely to the family sphere: in Victorian England, it was believed that the home was the only appropriate place for them, and that they should devote themselves to it completely as 'good angels of the household'. Unfortunately, this was the extent of their role – apart from the duty of running the household to perfection and caring for children and elderly women, they had no economic or legal privileges, nor could they inherit property or hold public office. Higher education also remained out of their reach for a long time – although aristocratic women attended classes in foreign languages, art, music, and literature, universities did not accept female students, and if they were allowed to attend lectures, they could not obtain a degree nor be entered into the register of graduates. The researcher emphasises that education was only intended to help them fulfil the role of an elegant and cultured wife at the side of her husband, who held important state and political positions.

However, the image of women as timid and incapable of great deeds that men created was broken by those who decided to take up the challenge of travelling. For many women, travelling was often the only chance to gain autonomy and independence – the journey offered an opportunity to escape the conventions and rigid moral constraints. Julia Szołtysek also points to the openness and curiosity of 19th century female travellers who built local communities in India, one of the most important British colonies at the time. The rapidly expanding colonial apparatus needed them desperately: not only as wives for officers stationed there but also as teachers, missionaries, nurses, and carers. Many of them also set off to India for more mundane reasons, such as starting a family, gaining social status, or finding a husband.

For many women who were travelling more and more frequently, discovering the Levant, India, or Arabia was a dream come true and the fulfilment of a long-standing fascination, as well as a mission linked to patriotism and a sense of responsibility towards Great Britain. This attitude characterised Gertrude Bell who, despite the restrictions imposed on women in the 19th century, had a great career in politics, archaeology, photography, and travel writing. During World War I, she was Winston Churchill's unofficial right-hand person for Arab matters and, together with T.E. Lawrence, took an active part in the campaign to divide the Ottoman Empire and establish the borders of British protectorates in these regions. There were even rumours that Bell and Lawrence were British spies in the Middle East! Interestingly, despite the hot climate, the traveller adhered strictly to the English etiquette: she wore elegant dresses with lace details, leather ankle boots, and a wide hat, and did not give up her corset. The carefully assembled attire did not prevent her from enjoying her beloved horse riding – Bell became a pioneer in wearing riding trousers, which she hid under a flowing skirt. They allowed her to ride comfortably without causing a scandal. The traveller also played an extremely important role in the creation of the state of Iraq – her efforts to achieve independence for the country earned her the nickname of the 'uncrowned Queen of the Desert'.

'She also helped establish the Iraq Museum, which was a milestone in building the identity of the Iraqi people', says the researcher from the Faculty of Humanities.

Another traveller who was enchanted by the Orient was Lady Mary Wortley Montagu, who accompanied her husband to Constantinople where he mediated peace talks between the Ottoman Empire and Austria (1716–1718). The British aristocrat was a fairly progressive woman – she allowed, among other

Mary Wortley Montagu by Charles Jervas (public domain, Wikimedia Commons)

Annemarie Schwarzenbach Photo: Anita Forrer (CC BY-SA 3.0, Wikimedia Commons)

things, the court physician to vaccinate her son against smallpox, which was an epidemic in Turkey at the time. Her decision shocked the British aristocracy of the time, who were distrustful of vaccinations, especially when administered by Ottoman doctors. What is more, the traveller had the opportunity to get to know the women of the harem and the rules that governed it. Thanks to these experiences, she was able to refute the accounts of male travellers who described the place as a hotbed of depravity and unbridled eroticism – Lady Mary proved that the harem was the heart of the home, an almost sacred space, intended for raising children, for women to spend time together, and which no man was allowed to enter. She also visited hammams – Turkish baths – many times, describing them as spaces serving personal hygiene, with a clear division between the women's and men's areas. Interestingly, Lady Mary hated the English court dresses she was required to wear from an early age.

'Upon arriving in Turkey and becoming familiar with the fashion there, she abandoned her muslin dress in favour of the local women's outfit, including a head covering, a veil to partially cover her face, and characteristic Turkish slippers', says Julia Szołtysek.

During her stay in Turkey, Lady Mary described her experiences in letters to her loved ones, which were published as a collection entitled Turkish Embassy Letters.

'Travelling is not an all-inclusive holiday – it involves a great deal of physical, emotional, and mental effort. Travel is often a limit situation, a kind of a rite of passage that puts us in difficult, often unpredictable conditions', emphasises the researcher.

This is clearly illustrated by the example of the 20th-century Swiss traveller Annemarie Schwarzenbach, who, despite being a highly educated person – fluent in eight languages – and coming from a wealthy family, often experienced physical and mental suffering during her travels. She was addicted to opium and morphine and struggled with depression, which resulted in several hospitalisations. Despite this, she never lost her desire to travel – she saw her last chance for salvation in a road trip from Switzerland to Afghanistan, which she embarked on in 1939 with her friend, fellow traveller and writer Ella Maillart. At that time, Annemarie promised to give up morphine and keep her companion regularly informed about her condition. The women recorded their experiences during the nine-month journey in their books, although their accounts differ drastically. The researcher points out that Maillart's text is entirely devoted to Schwarzenbach, in which the traveller describes her struggles with her friend, who repeatedly broke their agreement. In her diary, on the other hand, Annemarie describes exclusively her own experiences, and one could even get the impression that she went on this journey alone. Despite the difficulties, their journey was a success – the women arrived safely in Kabul, from where Annemarie travelled further east, and Ella returned by ship to Europe to prepare for her trip to China with Peter Fleming.

'Their journey is fascinating, because it shows how two women broke a travel taboo – they drove from Switzerland to Afghanistan, fleeing the war that was beginning to break out in Europe', says the researcher.

The researcher emphasises that today we are beginning to appreciate more and more the contributions of female travellers and their influence on culture, science, and universal civilisational heritage. The Gertrude Bell archive (maintained for years by Newcastle University), which has been included in the UNESCO's Memory of the World International Register, and in particular her photographs and maps, are the only record of many ancient civilisations in the Middle East, which would have been lost forever had it not been for her efforts. The lives of female travellers also inspire the world of art – in 2018, the Givenchy fashion house dedicated its autumn-winter collection to Annemarie Schwarzenbach, expressing its appreciation for her original, androgynous beauty. The biographies of these female travellers have also inspired several books and films that showcase their openness to the world and their pursuit of independence.

Weronika Cygan-Adamczyk

BETWEEN EUROPE AND AFRICA

SCIENCE ON THE MOVE

Usually, getting there is a quicker ordeal, but this time it took 24 hours. After leaving Poland, we had to spend a night at the Frankfurt Airport waiting for a flight to Kenya. When we finally landed in Nairobi, we still had a train journey to Mombasa ahead of us. Charter flights are shorter, allowing you to save up to ten hours at the expense of comfort – sitting in a cramped space with your knees up to your chin. Scheduled flights are less demanding, but two or three layovers extend the entire trip to two days or more.

Photos from the top:
1. Children from the primary school in Wasini | Photo: Anna Watoła
2. Classes with pupils at the primary school in Amboseli | Photo: Marta Sitkowska
3. Meeting at a primary school in Mombasa | Photo: Barbara Gniadek

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The above description sounds like an excerpt from a travelogue, and in a sense it is. However, it does not refer to a sightseeing trip but a scientific expedition and research. Anna Brosch, PhD, and Anna Watoła, PhD, both from the Institute of Pedagogy at the Faculty of Social Sciences of the University of Silesia, have been visiting selected African countries for years as part of various scientific initiatives. They are currently working on the project entitled 'Growing online – how to protect our children in the digital world?'. The experts want to take a look at the problem of the so-called 'sharenting' – parents sharing images of their children on social media – which carries many potential risks. The study will collect data from Poland, the Czech Republic, the United Kingdom, and Kenya.

'Many of our doctoral students are interested in travelling abroad. Everyone is keen on going to London or Prague, but getting people to go to Nairobi is proving more of a challenge', says Anna Watoła. She explains that many people are put off by the relatively long stay, which can extend up to two months.

The conditions, which are different from those we are used to in Europe, also pose a challenge. The much warmer climate in the Mombasa area, combined with high humidity, which can reach 90% at times, can be difficult to handle for those not accustomed to it. Appropriate clothing is, therefore, essential – during the day to protect against excessive sun and at night to prevent insects from coming into contact with the skin. Large mosquito populations and the risk of certain diseases mean that vaccinations and preventive measures are recommended before travelling to Africa and during your stay on the continent. People with sensitive stomachs who prefer to avoid meat or seafood might struggle. The same goes for those who value their privacy, as it is not uncommon in Kenya to find yourself sharing a room with several people, including strangers.

The experts point out these potential inconveniences not to discourage young researchers. On the contrary, they want to prepare them for the challenges that lie ahead and the extraordinary opportunities to explore various social processes and learn about different cultures.

The research carried out by the scientists cannot be conducted online. In a country where many households still do not have regular access to electricity, relying on electronic surveys would only limit the group of respondents.

'We want to reach everyone, so we will use questionnaires printed and translated into Swahili, because although Kenya has two official languages, English and Swahili, many people, especially the older generation, do not speak English at all', explains Anna Brosch, head of the research project on sharenting.

Including Kenyans in the study, in addition to Poles, Britons and Czechs, will provide valuable knowledge about the impact of modern technologies on communities that started using them a little later than those in the so-called West. Experts from the University of Silesia note that while sharenting in Europe has now taken the form of a marketing machine involving celebrities and influencers, in Africa the phenomenon is only just beginning to spread. Kenyan parents post photos of their children online with even less awareness of the dangers involved, such as potential exposure to paedophiles or (even unintentional) ridicule of young people, which can lead to developing self-esteem issues or difficulties in relationships with their peers.

As part of the project, cooperation has already been established with researchers from Pwani University in Kenya. These contacts were established during previous trips – Anna Brosch spent over a year in Kenya and, together with Anna Watoła, visited African countries over 30 times. The acquaintances made years ago are now bearing fruit in the form of further scientific cooperation with local experts.

Despite their extensive knowledge of the region, both researchers still find things that amaze them, and their curiosity remains a driving force behind their scientific expeditions.

'About five years ago, a new and very modern railway line built by the Chinese was put into operation. I dreamt of riding it, but unfortunately my friend beat me to it!', Anna Watoła laughs and adds: 'This railway is unlike anything else in Kenya – it is punctual. The locals not only have a unique approach to time but also a saying that contains profound wisdom: You have watches, we have time'.

HENRYK BARANOWSKI AND HIS JOURNEY THROUGH THEATRE AND LIFE

Inbetween worlds

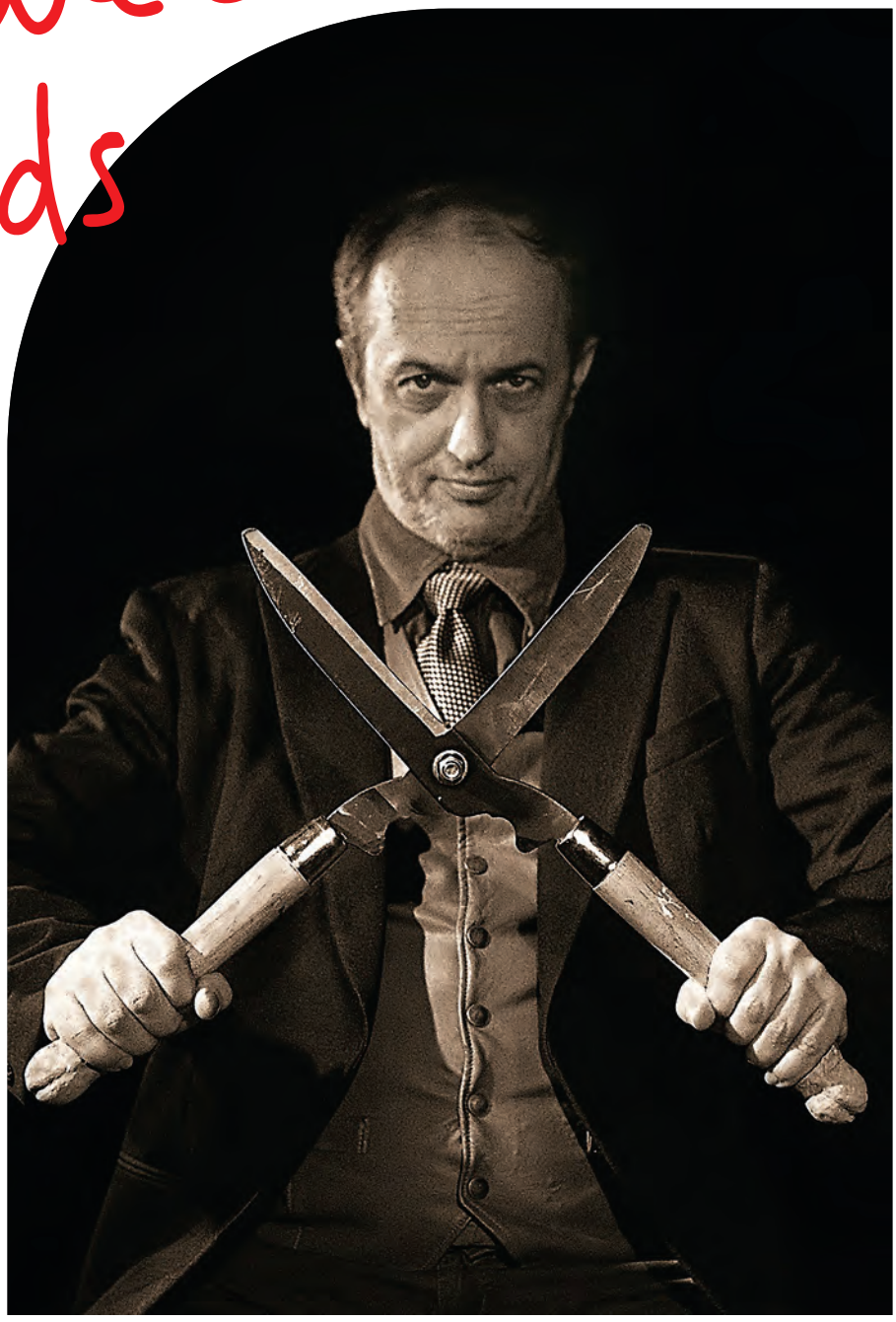

Photo: Svetlana Bakushina

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In the works of Henryk Baranowski (1943–2013) – director, emigrant, teacher, philosopher, and actor – travel was not only a geographical experience but also a spiritual necessity and an artistic tool. He directed over 60 theatre and opera productions in Europe, Russia, and the USA. From the stages of Warsaw to Kreuzberg in Berlin and New York's experimental theatres, Baranowski was constantly on the move, crossing cultural and aesthetic boundaries and pushing his own limits. He was not afraid to experiment. His life and theatre represent a multidimensional journey through eras, places, and ideas, as well as a record of transgression, transformation, and the search for meaning. At a time when the world around us remains in constant motion, his art proves surprisingly relevant.

Henryk Baranowski studied mathematics at the University of Wrocław and graduated in philosophy from the University of Warsaw (1968) and in directing from the State Higher School of Theatre in Warsaw (1973). He directed, designed stage sets, wrote screenplays, produced radio plays, and staged his own productions for Teatr Telewizji (Television Theatre). He left behind a volume of poetry, voice recordings, and recordings of his performances. He played the lead role in Krzysztof Kieślowski's *Dekalog I* (1988) and Napoleon in Andrzej Wajda's *Pan Tadeusz* (1999). The themes of wandering, exile, identity, and return were recurring motifs in his performances.

Between 1967 and 1980, he directed many significant works of world drama (including Genet, Ibsen, Handke, O'Neill, and Kafka) and Polish drama (including Gombrowicz, Fredro, Mickiewicz, and Kajzar) on Polish stages, often as his own adaptations. After his controversial staging of *Dziady* (1977), Baranowski was blacklisted, which prevented him from continuing his artistic career in Poland. In 1980, he was forced to emigrate and ended up settling in a Berlin district populated by artists, migrants, and rebels. This decision changed his life and his art. This is where he founded Transformtheater (1981–1992) – a place that was simultaneously a stage, a school, and a refuge for people from all over the world. The group gained Europe-wide recognition and participated with great success in international festivals in Germany, Portugal, Italy, and the Netherlands, among others. Born out of alienation and nourished by hope, the theatre became a space for transformation, a map of personal and social change.

Many of Baranowski's productions were staged abroad. Theatres in Berlin, Cottbus, London, Oslo, New York, Chicago, Las Vegas, Novosibirsk, Omsk, and St. Petersburg welcomed his theatre and opera productions combining classicism with avant-garde, spirituality with physicality and various forms of artistic expression. He also put his artistic skills to use in his educational work, mainly abroad. While in the United States, he directed Tabori's *Peepshow* with his own set design (winning the 1992 Joseph Jefferson Award for Best Ensemble of the 1991/1992 season), Kafka's *The Trial* at the University of Tennessee, Różewicz's *White Marriage* at New York University, Aeschylus' *Oresteia* in Knoxville, and Genet's *The Balcony* at Judy Bayley Theatre, University of Nevada, Las Vegas.

In the early 1990s, the artist received the ITI Award for promoting Polish culture and an award from the Minister of Foreign Affairs (1993) for his work and outstanding contributions to the promotion of Polish art abroad.

The stage was everything to Baranowski. In the later part of his career, he focused largely on operas. His staging of Philip Glass's *Akhnaten* at the Grand Theatre in Łódź received widespread critical acclaim and won him the Golden Mask Award for the best director of the 1999/2000 season. He has also worked with Russian theatres. In 2004, he received the Russian Golden Mask for the best opera production in Russia in 2003 for his staging of Alfred Schnittke's *Life with an Idiot* at the Novosibirsk Opera and Ballet Theatre in co-production with Hahn Produktion in Berlin.

Looking back at his correspondence, scripts, and memoirs, it is clear that he saw the concept of *homo viator* (traveller) not only as a philosophical metaphor but as an everyday experience. In the last years of his life, he struggled with cancer. He wrote about it candidly in his 2013 autobiography, *Spowiedź bez konfesjonału Wędrówki pomiędzy sztuką, magią i medycyną (Confession without a Confessional. Wanderings between Art, Magic, and Medicine)* – without pathos: about the pain that reveals something and coming to terms with one's fate. His last journey was an inner one. However, it was no less intense than those that came before. 'I finally found happiness that was always so close – within me' is an insight by Baranowski that holds the key to understanding his art. The essence of motion is not place, but transformation; finding oneself is the furthest journey one can take.

Today, in a world marked by migration, cultural clashes, and questions of identity, Henryk Baranowski's art takes on a new meaning. His theatre did not provide ready-made answers, but space – between languages, aesthetics, experiences, and across borders. This is the space we are all desperately searching for today.

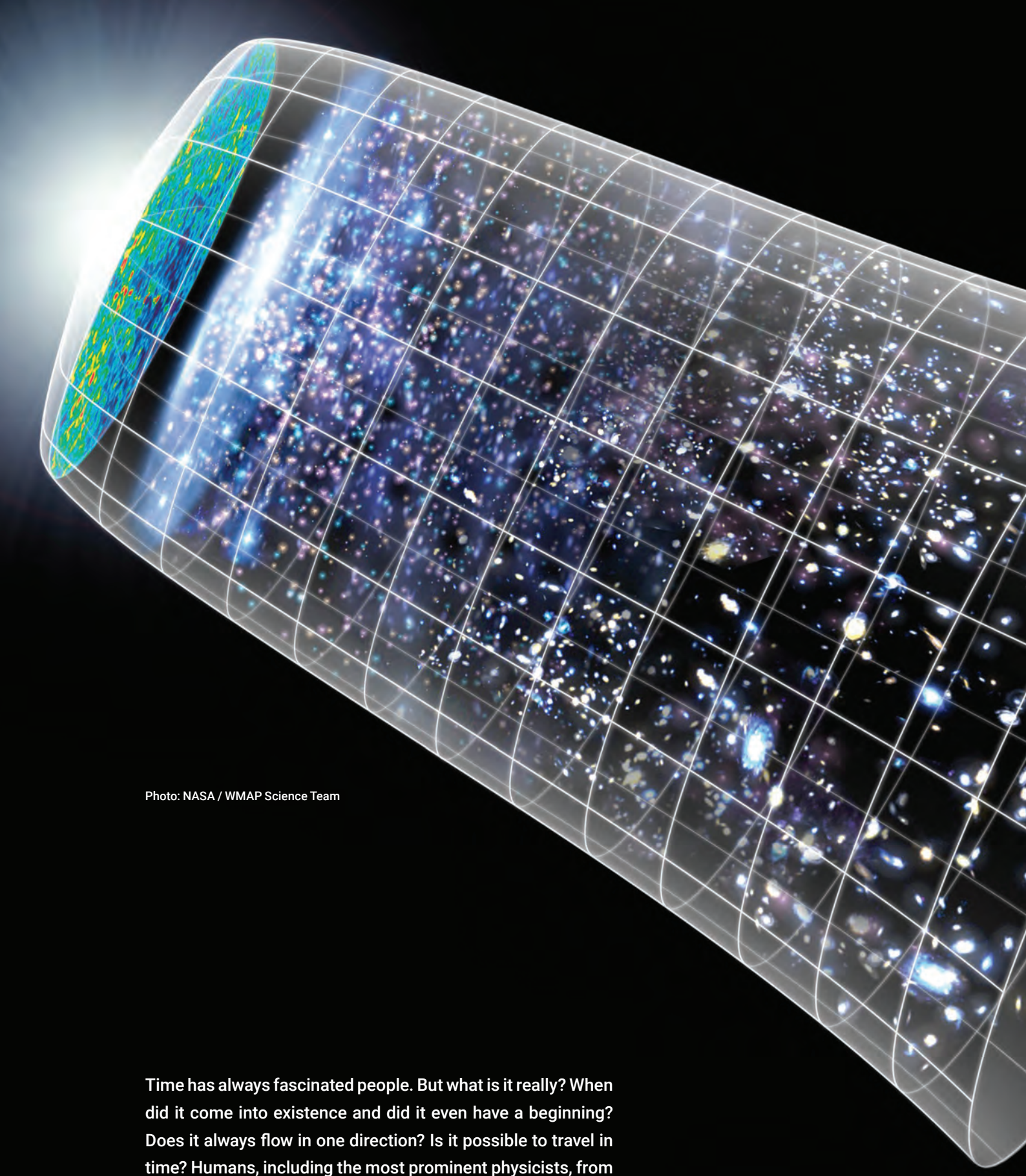

Photo: NASA / WMAP Science Team

Time has always fascinated people. But what is it really? When did it come into existence and did it even have a beginning? Does it always flow in one direction? Is it possible to travel in time? Humans, including the most prominent physicists, from Albert Einstein to Stephen Hawking and Michio Kaku, have been searching for answers to these questions since time immemorial.

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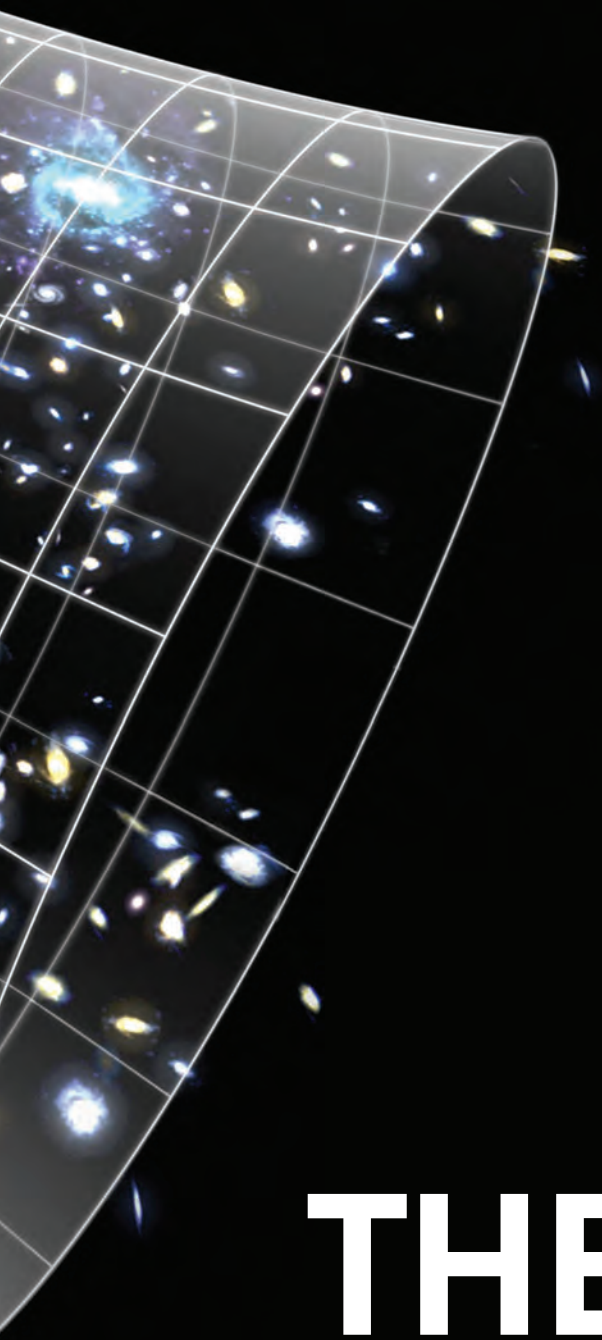


THE PHYSICS OF SPACE-TIME TRAVEL

THE BIG BANG AND THE BEGINNING OF TIME

'According to our current knowledge, it is assumed that the universe was born about 13.8 billion years ago as a result of the so-called Big Bang. Contrary to its name, the universe did not begin with a blast, nor was there any such point from which something could have exploded', explains Prof. Jan Sładkowski, a physicist from the Institute of Physics of the University of Silesia in Katowice, adding, 'The universe began to expand rapidly from an unimaginably hot and infinitely dense state called the initial singularity. It was then, according to contemporary cosmological models, that space and time were born. Consequently, it is not possible to assert that there was anything prior to the Big Bang, despite the existence of various speculations'.

Time and space have been inextricably linked since the beginning of the universe. This gave rise to the concept of *space-time*. The term was coined by Hermann Minkowski, a German mathematician and physicist of Jewish origin, and Albert Einstein's teacher. In 1907, Minkowski proposed an interpretation of time as the fourth dimension.

In 1915, Albert Einstein published his general theory of relativity, which completely changed our understanding of gravity and the structure of the universe. In the new framework, gravity was no longer regarded as a classical force acting at a distance (as in Newtonian mechanics), but rather as a manifestation of the curvature of space-time due to mass and energy. Massive objects such as planets and stars deform this four-dimensional structure like a ball that bends the surface of an elastic membrane, affecting the passage of time and the trajectories of moving bodies. In general relativity, as in special relativity, time and the chronology of events are not absolute. A clock located closer to a massive object (e.g. a black hole) ticks more slowly than a clock located in a weaker gravitational field. This is known as gravitational time dilation – a phenomenon confirmed experimentally e.g. by GPS satellites, which must take into account corrections resulting from relativistic effects in order to function properly. Einstein's theory became the foundation of modern cosmology and allowed us to describe how the universe evolved.

THE EVOLUTION OF THE UNIVERSE

'In fact, all our considerations about the evolution of the universe up to the point when it reached an age of approx. 380,000 years are pure speculation. Descriptions are only really reliable when they refer to a time when the universe was at least half a billion years old', notes the physicist. 'The observed large-scale homogeneity suggests that the universe must have undergone a phase of rapid expansion called inflation immediately after its birth, during which it doubled its dimensions every 10^{-37} seconds. The strangest and most speculative stage of the universe's evolution, the so-called Planck era, lasted until 10^{-43} seconds after the Big Bang. At this time, due to extremely high temperature and density, all four fundamental forces of nature (gravitational, electromagnetic, weak nuclear, and strong nuclear) could have been one superforce. The universe certainly did not resemble anything we can imagine, as our current knowledge and known theories (including general relativity and quantum mechanics) do not enable us to fully describe what could have happened in the Planck era. It is believed that this was a state in which space-time itself was a quantum phenomenon – full of fluctuations, instability, and probabilities'.

About 10^{-43} seconds after the Big Bang, the universe cooled down enough for gravity to separate from other forces. The appearance of the so-called Higgs field, associated with the Higgs boson, was a fundamental moment for the existence of the universe.

'It is believed that shortly after the end of cosmic inflation, when the universe was only a fraction of a second old, the Higgs field underwent a so-called spontaneous symmetry breaking, i.e. it "froze" in a specific energy state', explains Prof. Sładkowski. 'This had certain fundamental consequences – elementary particles considered in the so-called standard model, which previously ($t < 10^{-12}$ s) were massless, began to interact with the field and gain mass. However, it should be emphasised that this is our explanation of where the mass of particles comes from, but it remains a hypothesis, even though the confirmation of the existence of the Higgs boson was awarded with the Nobel Prize'.

The first atomic nuclei began to appear between 1 second and 3 minutes after the Big Bang. They were mainly protons (hydrogen nuclei), deuterium, helium-4, and trace amounts of lithium-7 and possibly beryllium. When the temperature dropped to around 3,000 K, electrons began to combine with nuclei to form the first neutral atoms – primarily hydrogen (H) and helium (He). The so-called dark ages lasted from 380,000 to about 100 million years – there were no stars or galaxies yet, only a cold, thin fog of hydrogen and helium gas. Gravity slowly condensed local fluctuations of matter, leading to the collapse of the first gas clouds. Protogalaxies and star-forming clouds developed. The gas continued to condense and heat up until the first stars ignited.

'The first stars (known as Population III stars) were very different from the stars we know today. They were very massive and consisted only of hydrogen, helium, and lithium – they did not contain any heavier elements. They shone very brightly but lived only a short time – from a few million to several tens of millions of years – and ended their lives as supernovae or collapsed into black holes', explains the physicist from the University of Silesia. 'Heavier elements were formed inside the next generation of stars or supernova explosions (there is a theory that they were also formed in neutron star collisions), becoming the seed for the formation of planets and the elements of life'.

The first stars and galaxies emitted powerful radiation that ionised hydrogen atoms and distributed elements throughout the universe. Galaxies similar to the Milky Way began to form about 1–1.5 billion years after the Big Bang.

Although the theory of relativity allows us to regard time as a spatial dimension, i.e. as reversible to some extent, our everyday experience tells us otherwise – time flows in one direction. This direction is determined by the arrow of time, which is closely related to the second law of thermodynamics. According to this law, entropy – a measure of disorder – always increases. This is why we can remember the past but not the future, and why we cannot restore a broken egg to its pre-broken state. But do the laws of physics prohibit time travel? Here, the matter becomes more complex, and also more fascinating.

General relativity allows for solutions involving the so-called closed timelike curves, which are trajectories in space-time of a material point moving at a speed lower than the speed of light. 'Closed' refers to the fact that a point, while moving, can effectively return to the moment before it started its journey. This is the source of much speculation about the possibility of time travel.

One concept of time travel is the idea of a space-time tunnel (a wormhole). This is a hypothetical structure that connects two distant points in space-time (sort of like a bent piece of paper). Its existence was considered by Albert Einstein and Nathan Rosen, who in 1935 proposed a theoretical description of the so-called bridge (today this structure is called the Einstein-Rosen bridge or Schwarzschild wormhole). In a sense, it is a mathematical 'construction' connecting two black holes (or rather, a black hole on one side and a white hole on the other). However, the structure is unstable and will most likely close before any information or particle can pass through it. For a wormhole to be stable and passable, it needs exotic matter (matter that repels itself gravitationally). There is no such matter in the Einstein-Rosen model and we know of no argument suggesting its existence. On top of that, it does not allow for time travel, only travel in space. Therefore, it is a beautiful construct, but more theoretical than physical.

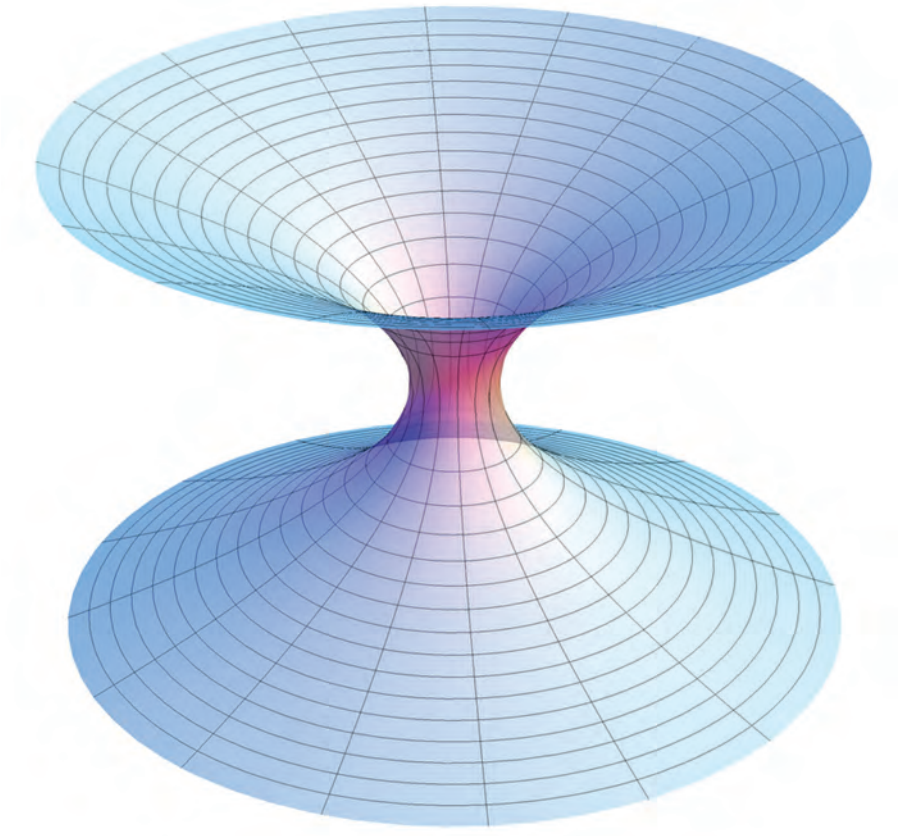
In the 1980s, physicists Kip Thorne and Michael Morris proposed a different type of tunnel – stable and passable, later named the Morris-Thorne wormhole. This structure would also require exotic matter, however... this type of matter has not yet been observed anywhere in nature, although negative energy effects appear in some quantum phenomena (e.g. the Casimir effect).

Another physicist and string theory proponent Michio Kaku, also tackled the subject, repeatedly emphasising that although time travel is not contrary to the equations of general relativity, it remains technologically impossible. Kaku even described time travel as a 'class I impossibility'.

In the 1990s, Stephen Hawking proposed the so-called chronology protection conjecture. According to it, the laws of physics should somehow prevent the formation of closed timelike curves – trajectories that lead to the past and might lead to paradoxes (such as killing your own grandfather before he was born). Hawking argued that quantum fluctuations near the entrance to a hypothetical wormhole would be so violent that they would end up immediately destroying the structure that could enable time travel. In other words, the universe would defend itself against the paradoxes associated with time travel.

So, is time travel possible? From the point of view of theoretical physics – perhaps. From a technological point of view – probably not, at least for now. The development of a hypothetical quantum theory of gravity and research into the nature of black holes and space-time may provide new information in the future.

'We should also keep in mind that mathematical models reflecting our current knowledge will almost always be just mathematical models, even if they are capable of describing our environment very well. And what we call space-time today may not exist at all, but that's a story for a completely different conversation', concludes Prof. Jan Sładkowski.



Einstein–Rosen bridge | Illustration by AllenMcC. (CC BY-SA 3.0, Wikimedia Commons)

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Cover design by Karolina Malczewska, graduate of the Faculty of Arts and Educational Science of the University of Silesia in Cieszyn. The cover features an excerpt from her diploma project, *Wymarzona podróż (Dream Journey)*, created using linocut and screen printing techniques in 2025. It depicts a dream trip to South Korea, and shows a fragment of a map of Seoul with specific places highlighted, as well as images of important monuments and cultural motifs of Korea.