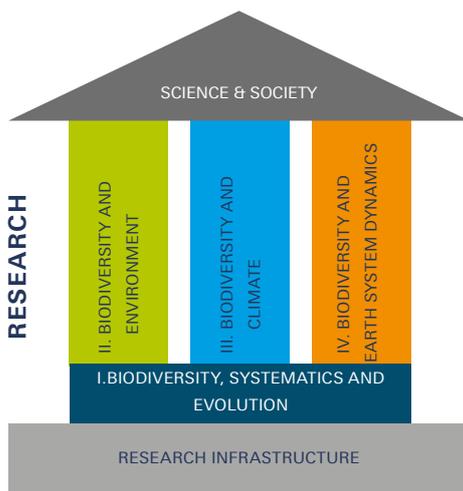




Dear Readers,

In this Highlights edition, you will encounter newcomers from the Arctic, spiders that live inside bamboo canes, snails that carry diseases in their luggage, and prehistoric humans with fine motor skills, among many others. We have selected two highlights from each of our four research fields: Biodiversity, Systematics & Evolution; Biodiversity & Environment; Biodiversity & Climate; and Biodiversity & Earth System Dynamics. These will be supplemented by highlights



from the areas of Infrastructure and Science & Society.

Of special importance is the nation-wide flagship initiative “Preservation of Species Diversity,” which is coordinated by Senckenberg and will be supported by the Federal Ministry for Education and Research with a total of 200 million Euros over the next five years. This involves a rather innovative format of “transformative science,” which, in a joint effort between natural and social sciences, not only develops system solutions regarding the preservation and improvement of species diversity in Germany for so-called “socio-ecological systems” but also accompanies their implementation in cooperation with the stakeholders.

We hope you enjoy reading this newsletter!

Dr. Sören Dürr & Judith Jördens
Communication Staff

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BIODIVERSITY, SYSTEMATICS & EVOLUTION

NEWLY DISCOVERED TURTLE SPECIES FACES EXTINCTION



Variegatus is a Latin term that translates to “spotted” – and it has now become part of the scientific name of a turtle from Northern Vietnam and China. Together with an international team, Senckenberg scientist Prof. Dr. Uwe Fritz described this new species of the softshell turtle family. The newly discovered turtle with its distinctly spotted carapace occurs in Vietnam and parts of China and is acutely threatened with extinction.

Fritz, in conjunction with a team of German, Hungarian, and Vietnamese researchers, studied this armored member of the softshell turtle family – contrary to most turtles, these species do not possess a hard carapace with horny plates, but have a flexible, leathery shell – using genetic and morphological analyses. Fritz explains: “For a long time, the so-called ‘Chinese Softshell Turtles’ were thought to constitute a single, widespread species that occurs from Eastern Siberia to Vietnam. But the closer we look, the more different species we find hidden under the current name *Pelodiscus sinensis*. Our newly described species *Pelodiscus variegatus* is already the fifth recently discovered species in this genus.”

Until now, the newly described Spotted Softshell Turtle was thought to be part of the Lesser Chinese Softshell Turtle *Pelodiscus parviformis*, which was already considered threatened. “Now that its southern representatives have been separated as a different species, the Spotted Softshell Turtle, the overall population of each spe-



Newly discovered and already threatened: *Pelodiscus variegatus*. Photo: Prof. Dr. Thomas Ziegler, Cologne Zoo

cies is even smaller than previously thought,” explains Balázs Farkas, the study’s Hungarian lead author. The newly discovered species is not only endangered by hunting – softshell turtles are a prized food in the East Asian cuisine – and the destruction of its habitat; it appears that a foreign species has been introduced in Northern Vietnam, which may compete with the Spotted Softshell Turtle and potentially displace it.

>> Farkas B, Ziegler T, Pham CT, Ong AV, Fritz U (2019) A new species of *Pelodiscus* from northeastern Indochina (Testudines, Trionychidae). *ZooKeys* 824: 71-86.

<https://doi.org/10.3897/zookeys.824.31376>

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BIODIVERSITY, SYSTEMATICS & EVOLUTION

THE SPIDER FROM THE BAMBOO CANE



It inhabits hollow bamboo shoots: the newly discovered spider species *Rhitymna gerdmangel*. It belongs to the huntsman spider family and is only the second known spider whose ecology is closely linked to bamboo. Senckenberg scientist Dr. Peter Jäger has taken a closer look at this spider as one of four new species from the huntsman spider family.

To date, the newly discovered huntsman spider has only been found in two locations: in northern Thailand and near Kuala Lumpur in Malaysia. “The discovery sites lie approximately 1,800 kilometers apart from each other. Therefore, it can be assumed that this spider also inhabits other areas with bamboo stands but has simply been overlooked thus far,” adds the arachnologist from Frankfurt.

The newly discovered species of huntsman spider specializes on bamboo. Photo: Senckenberg

However, for Jäger, the true surprise comes with the spider's specialization on hollow bamboo shoots. To get inside these stable hiding places, the eight-legged creatures depend on the help of other animals in the neighborhood. They are aided by the activities of the bamboo woodpecker as well as beetles hatching from inside the bamboo. The larvae of the latter feed on hard-to-digest plant material, pupate, and eventually gnaw their way out of the bamboo shoots as adult beetles. "Lucky for the spiders, who can subsequently move into these protected cavities, which they only leave for their nocturnal hunting forays," adds Jäger.

The new spider's scientific name, *Rhitymna gerdmangel*, honors Senckenberg construction supervisor Gerd Mangel, who spearheaded the remodeling of the former buildings at the Goethe University's Bockenheim Campus into research buildings for the Senckenberg Society. "Our discovery in the bamboo indicates that the 48,000 species of spiders known around the world to date only represent a fraction of the group's actual diversity. Our new location now provides us with ideal conditions for our research and the collections," adds Jäger in conclusion.

>> Jäger, P. (2019) Review of the huntsman spider genus *Rhitymna* Simon, 1897 (Araneae: Sparassidae). *Zootaxa* 4560 (3), 441–462, doi: 10.11646/zootaxa.4560.3.2

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BIODIVERSITY & ENVIRONMENT

DEEP-SEA MINING LEAVES DEEP SCARS



It is obvious that mining activity leaves behind long-term traces – this is also true for the extraction of raw materials from the ocean floor. Together with an international team, Senckenberg scientists now examined the impact of deep-sea mining on the species diversity at the ocean floor. Their results: Even 26 years after the end of the mining activity – such as the extraction of manganese nodules – a significant loss of ground-dwelling organisms can be registered. Filter-feeding animals are particularly affected – more than two decades after the mining operations, almost 80 percent of the species remain absent.

"There are reliable studies that show that the extraction of manganese nodules, for example, has a negative impact on life in the deep sea," explains Dr. Lidia Lins of the Senckenberg Research Institute in Frankfurt, and she continues, "However, if and when the animals will recover from the effects of mining has been insufficiently studied to date."

Together with an international team, the Senckenberg scientist therefore examined the effects of the "DISturbance and reCOLO-

nization (DISCOL)" experiment on ground-dwelling deep-sea organisms. During the series of scientific experiments that started in 1989, 22 percent of an area in the Southeast-



Manganese nodules from the study area in the Pacific. Photo: Senckenberg/Lins

tern Pacific measuring a total of 10.8 square kilometers and rich in manganese nodules was plowed using heavy equipment. The area was revisited at intervals of one month,

six months, three, seven, and 26 years after the disturbance to study and assess the diversity of the macro- and megafauna and the frequency of occurrence of fish species.

The results are alarming. "We were able to show that the deep-sea ecosystems only recover very slowly from the impact – almost 30 years after a comparably minor disturbance, barely half of the life forms have returned to the area. We therefore strongly advocate the establishment of protection zones in the oceans!"

>> Stratmann, T., Lins, L., Purser, A., Marcon, Y., Rodrigues, C. F., Ravara, A., Cunha, M. R., Simon-Lledó, E., Jones, D. O. B., Sweetman, A. K., Köser, K., and van Oevelen, D.: Abyssal plain faunal carbon flows remain depressed 26 years after a simulated deep-sea mining disturbance, *Biogeosciences*, 15, 4131-4145, <https://doi.org/10.5194/bg-15-4131-2018>, 2018.

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BIODIVERSITY & ENVIRONMENT

DISEASE CARRIER WITH A SNAIL SHELL



According to estimates by the World Health Organization (WHO), around 2.5 million people worldwide are affected by fasciolosis – an infection with the common liver fluke, *Fasciola hepatica*. The parasite, who belongs to the class of Trematoda (flukes), normally inhabits the gall ducts of ruminants such as cattle, goats, and sheep. However, in certain cases it can infect the human liver as well. Water snails such as *Austropeplea viridis* and *Galba cubensis*

serve as vectors for the disease.

For the first time, Senckenberg scientist Dr. Katrin Schniebs and her international team were now able to document these vectors in Europe.

A large number of the snails were collected by Schniebs' Spanish colleagues and the study's co-authors, Dr. Joaquin Lopez-Soriano and Dr. Sergio Quinonero-Salgado, in the Catalan Ebro Delta and subsequently examined at Senckenberg Dresden, using

molecular-genetic methods. "Since these snail species only show very minute morphological differences from other species, genetics offers the sole means for reliable identification," explains Schniebs.

The liver fluke snail *Galba cubensis* is the most important intermediate host for the liver fluke *Fasciola hepatica* in the Caribbean and the southern United States as well as a potential intermediate host for the notably larger liver fluke species *Fascioloides magna*.



New arrival in Europe: the pond snail *Austropeplea viridis*. Photo: Senckenberg

Moreover, the snail species is considered an intermediate host for the fluke species *Heterobilharzia americana*, which parasitizes various mammal species and causes great damage in animal husbandry. Another pond snail species newly discovered in Europe, *Austropeplea viridis*, also serves as a potential intermediate host for the liver fluke. “We assume that the snails collected in the Spanish rice fields came from the nearby aquacultures and spread from there. Besides the two aforementioned species, other invasive snails were also encountered at high densities – the Spanish Ebro Delta can therefore be considered a kind of ‘hotspot of invertebrate invasions,’” explains Schniebs. The team of scientists fears that the potential disease carriers may continue to spread across Europe – the Spanish health authorities have already been alerted to this risk factor.

>> Schniebs, K., Glöer, P., Quiñonero-Salgado, S., Lopez-Soriano, J., & Hundsdoerfer, A. K. (2018) The first record of *Galba cubensis* (L. Pfeiffer, 1839) (Mollusca: Gastropoda: Lymnaeidae) from open fields of Europe. *Folia Malacologica*, 26(1), 3-15. <https://doi.org/10.12657/folmal.026.002>
 Schniebs, K., Glöer, P., Vinarski, M.V., Quinonero-Salgado, S., Lopez-Soriano, J., Hundsdoerfer, A.K. 2017: A new alien species in Europe: First record of *Austropeplea viridis* (Quoy & Gaimard, 1833) (Mollusca, Gastropoda, Lymnaeidae) in Spain. *Journal of Conchology* 42(5): 357-370.

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BIODIVERSITY & CLIMATE

A NEW HOME IN THE ARCTIC: TALLER PLANTS INVADE THE TUNDRA IN THE WAKE OF CLIMATE CHANGE



Until now, the Arctic has been a domain of low-growing grasses and dwarf shrubs. In order to withstand the harsh environmental conditions, they squat close to the ground, often reaching no more than a few centimeters in height. But in the past 30 years, noticeably taller plant communities have begun to spread in the Arctic tundra. This is now being reported by a group of nearly 130 international biologists led by the Senckenberg Biodiversity and Climate Research Institute and the German Center for Integrative Biodiversity Research (iDiv).

The study, which was initiated by a working group funded by the German Center for Integrative Biodiversity Research (iDiv), is based on the evaluation of the most comprehensive data set regarding plants in the Arctic tundra available to date. The data show that “the additional growth was not restricted to specific areas but occurred almost across the entire area,” explains the study’s lead author, Dr. Anne Bjorkman of the Senckenberg Biodiversity and Climate Research Institute.

According to the researchers, global climate change is responsible for this develop-

ment. Over the past 30 years, the temperatures in the Arctic have risen by about 1 degree in the summer and 1.5 degrees in the winter. This makes the Arctic one of the fastest-warming regions on earth.

A detailed analysis shows that not only do individual plants grow taller as a result of

higher temperatures, but the composition of the entire plant community changes as well. And this development has not yet come to an end. “If the taller plants continue to spread at the current rate, the overall height of the tundra’s plant communities may see an additional increase by 20 to 60%,” says Bjorkman. Surprisingly – accor-



The plant communities in the Arctic tundra have grown taller during the past thirty years. Photo: Anne Bjorkman

ding to the study – the increase of taller plants does not automatically cause the disappearance of the lower-growing species. The Arctic tundra receives a great deal of attention in climate research since the permafrost soils store about one third to half of the carbon bound in soils worldwide. When the soil thaws, this can lead to the release of greenhouse gases – and an increase in taller plants may accelerate this process, since in the winter, more snow accumulates around taller plants. This insulates the underlying soil, which therefore does not freeze as

quickly or deeply.

According to the authors, the second result suggests that the plant communities' overall reaction to the climate change depends on whether the tundra becomes dryer or wetter.

>> Bjorkman, A. et al. (2018): Plant functional trait change across a warming tundra biome. *Nature*, doi: 10.1038/s41586-018-0563-7

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BIODIVERSITY & CLIMATE

EXPANSION OF BIOENERGY PLANT CULTIVATION IS AS DETRIMENTAL TO NATURE AS CLIMATE CHANGE



In order to prevent the global temperature from rising by more than 1.5 degrees until 2100, compared to the pre-industrial era, the amount of CO₂ released into the air around the globe must be drastically reduced. A limited climate change also benefits nature, since it is one of the causes of species extinction. A common, currently used approach involves the increased generation of energy from renewable resources such as maize, rape, oil palm, etc., instead of using fossil resources. According to new models, this actually leads to the destruction of a larger percentage of vertebrate habitats than would benefit from a reduced climate change, as reported by researchers at the Senckenberg Biodiversity and Climate Research Center, the Technical University in Munich, and Durham University.

Among scientists, bioenergy has long been a contentious topic that was only subject to individual studies until now. Along with his team, Dr. Christian Hof, who conducted the study at the Senckenberg Biodiversity and Climate Research Center in Frankfurt and who now carries out research at the TU Munich, examined for the first time on a global scale how the climate and land-use changes will affect amphibians, birds, and mammals by the year 2100. To this end, they compared two scenarios: one with maximum bioenergy use, which corresponds to limiting the temperature increase to approx. 1.5 degrees, and a scenario with minimum bioenergy use and a temperature increase of approx. 3 degrees until 2100, compared to the pre-industrial era.

The results come as a surprise. "Regardless of whether the temperature increases by 1.5 or 3 degrees until 2100, around 36 % of vertebrate habitats are massively threatened, either due to climate change or the new land-use practices based on the cultivation of bioenergy plants. The effects on biological diversity are thus comparable. The only difference is who ultimately pays for it," explains Dr. Alke Voskamp of the Senckenberg



In order to achieve the 1.5 degree goal, up to 4.3 percent of the global land area would have to be dedicated to the cultivation of bioenergy plants (pictured: a maize field). Copyright: Christian Hof

Biodiversity and Climate Research Center. Moreover, the slowing down of climate change through the use of bioenergy plants is likely going to harm many more vertebrate species with a small range than would be the case with a temperature increase by 3 degrees. Such vertebrates – amphibians, in particular – primarily live in the Tropics and Neotropics. And those areas will see the largest increase in bioenergy plantations. For Hof and his team, the study only allows one conclusion. "Climate change continues to be the most severe threat to biological diversity and must be limited to a temperature increase of no more than 1.5 degrees, if at all possible. However, as our study shows, bioenergy and the massive expansion of cropland for this purpose is the wrong approach. Instead, we must put increased efforts into saving energy."

>> Hof, Chr. et al. (2018): Bioenergy cropland expansion may offset positive effects of climate mitigation for global vertebrate diversity. *PNAS*, doi: 10.1073/pnas.1807745115
<https://www.pnas.org/content/early/2018/12/05/1807745115>

SGN-Contact:

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BIODIVERSITY & EARTH SYSTEM DYNAMICS

PREHISTORIC HUMANS WITH A DELICATE TOUCH

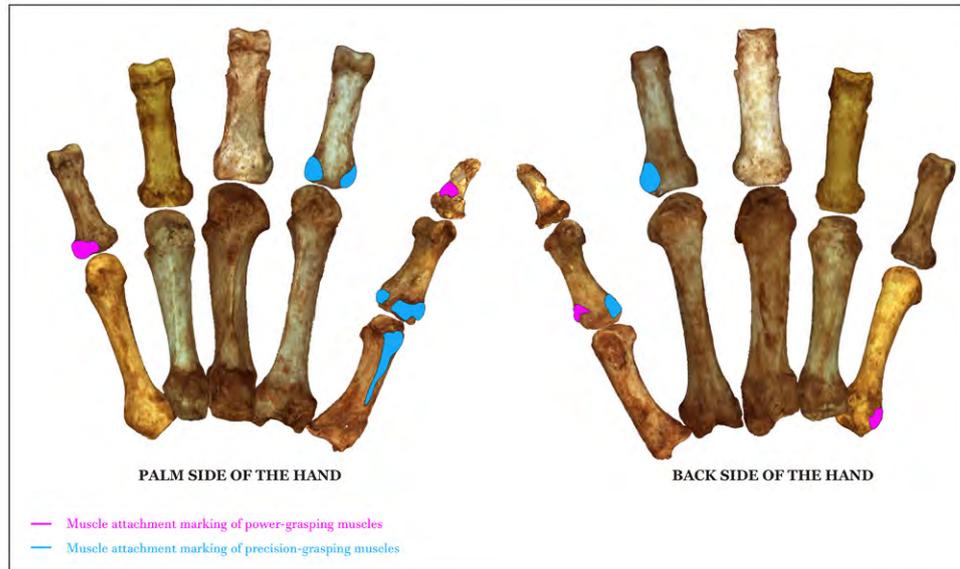


The Neanderthals (*Homo neanderthalensis*), who lived between 400,000 and 40,000 years ago, are often portrayed as physically strong but otherwise rather clumsy early ho-

minids that primarily relied on their strength in the construction and handling of tools. Using an innovative method, a team led by Senckenberg scientist Prof. Dr. Katerina Harvati has now been able to show that the supposedly coarse relatives of modern man primarily managed their day-to-day tasks with a "delicate touch." The study revealed that Neanderthals systematically employed "precision grips" in their manual activities. Contrary to the "power grip," which uses the entire palm, including all fingers and the

thumb, for gripping, the holding and guiding of objects with the "precision grip" is primarily done with the tips of the thumb and index finger.

To double-check the results gained from the examined Neanderthal hand bones, they were compared to samples from the "Basel Spital Cemetery" collection of the Natural History Museum in Basel. "This unique collection from the 19th century offers identified skeletons, including information about the circumstances of the life and the profession of the deceased," explains Dr. Gerhard Hotz of the Natural History Museum in Basel, and he continues, "If, for example, we examine a blacksmith's hand, we can show by means of the muscle attachment points that he regularly used 'power grips' during his day-to-day activities."



Muscle attachment markings for power grips (pink) and precision grips (blue). Photo: Senckenberg

None of the examined Neanderthal hand skeletons showed evidence of a sustained use of power grips. Contrary to this, the hand bones of early *Homo sapiens* show traces of the systematic use of both precision as well as power grips, supporting the hypothesis that the division of labor in our ancestors intensified for the first time during the Upper Paleolithic.

minids that primarily relied on their strength in the construction and handling of tools. Using an innovative method, a team led by Senckenberg scientist Prof. Dr. Katerina Harvati has now been able to show that the supposedly coarse relatives of modern man primarily managed their day-to-day tasks with a "delicate touch." The study revealed that Neanderthals systematically employed "precision grips" in their manual activities. Contrary to the "power grip," which uses the entire palm, including all fingers and the

"Since muscles and tendons are usually not preserved in the fossil record, we examined the impressions of the 'entheses' or 'muscle attachment markings' – the areas where muscles and tendons are attached to the bone," explains Harvati. In the process, the team from Tübingen and Basel employed a new method that uses three-dimensional measurements and analyses of entire groups of muscle attachment markings instead of just individual markings.

>> F. A. Karakostis, G. Hotz, V. Tourloukis, K. Harvati (2018): Evidence for precision grasping in Neanderthal daily activities. *Science Advances*.

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BIODIVERSITY & EARTH SYSTEM DYNAMICS

MONKEYS FROM THE NORTH SEA



Yielding the remains of woolly rhinoceroses, broad-fronted moose, cave lions and forest elephants, the bottom of the North Sea has long been considered one of the most important fossil sites for the reconstruction of life in Europe during the Ice Age. Together with two colleagues from the Netherlands, Senckenberg scientist Ralf-Dietrich Kahlke was now able to assign several teeth and a lower jaw fragment to the primate species *Macaca sylvanus*.

They constitute the first fossil evidence of Old World monkeys from the guenon family in the North Sea region. The discoveries date from different interglacial periods during the Ice Age. They came from animals that bore a

striking resemblance to the modern Barbary macaques still found around the Rock of Gibraltar today. "Unfortunately, we are unable to determine the age of the teeth with absolute certainty, since the fossils can no longer be assigned to their original sediment layer," explains the study's lead author, Prof. Dr. Jelle W.F. Reumer of Utrecht University.

But how do the bones of terrestrial mammals from the Ice Age end up at the bottom of the North Sea? Kahlke explains: "The region that is the North Sea today only flooded once the Ice Age glaciers began to melt and the English Channel opened into an inlet. Prior to that time, the topography of Northwest Europe was primarily influenced by chan-

ging sea levels, which in turn were determined by the climate conditions. The retention of an enormous volume of water in the Ice Age glaciers caused the sea level to drop by up to 120 meters during the time of maximum glaciation in the last glacial period a little over 20,000 years ago. Large parts of the current North Sea also dried out and could be inhabited by terrestrial animals. They are the source of the fossils we now find on the ocean floor. Similar events also occurred in earlier periods."

Modern macaques are adept climbers that prefer rocky landscapes. However, such rock formations did not exist during the Ice Age in the area of the current North Sea. The team



of scientists assumes that the roughly 70-centimeter-long animals found refuge in trees instead. It therefore stands to reason that the macaques' habitat – covered by water and sediments today – must have been at least partially forested.

>> Reumer, J. W. F., Mol, D., Kahlke, R.-D. (2018): First finds of *Macaca sylvanus* (Cercopithecoidea, Primates) from the North Sea. – *Revue de Paléobiologie* 37 (2): 555-560, doi: 10.5281/zenodo.2545095.

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 Prof. Dr. Ralf-Dietrich Kahlke
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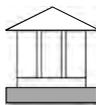
Upper left canine tooth of the fossil macaque species from the bottom of the North Sea. Photo: S. Döring, Senckenberg, Weimar

h. c. Volker Mosbrugger, and he continues, "My special thanks go to the State of Hesse and the Federal Government for making this gigantic remodeling project possible with their financial support." The remodeling measures have optimized the scientists' research conditions. "By housing the different scientific disciplines in a single building complex at the Frankfurt location, new synergies are generated for studying the Earth system," adds Prof. Dr. Andreas Mulch, the Director of the Senckenberg Research Institute and Natural History Museum.

Hesse's Minister President Volker Bouffier congratulates the Senckenberg Society on the successful remodeling project. "To create a living and functional building in the middle of the city that continues to tell its past story while at the same time enabling future-relevant research at the highest level – that was our vision, which was realized in an outstanding fashion. With roughly 117 million Euros, the federal government and the State of Hesse invested a large sum of money to ensure that Senckenberg will still be given the best

RESEARCH INFRASTRUCTURE

THE NEW SENCKENBERG RESEARCH INSTITUTE

 22 million collection objects have been moved, climate-controlled collection rooms and laboratories were established, and modern working rooms were created – the largest construction project to date in Senckenberg's history. About seven years after the start of the initial planning and a little over four years after construction began, the Senckenberg Gesellschaft für Naturforschung celebrates the pending completion in the banquet hall

of the Jügelhaus. The scientists will now be able to work and conduct research in the immediate vicinity of their collections, applying the latest standards.

"I am elated on this festive occasion to celebrate with you the successful completion of this large construction project, which will provide the necessary infrastructure for our institute in Frankfurt with its excellent research and outstanding collections," says Senckenberg's Director General, Prof. Dr. Dr.



Staircase in the Jügel House. Photo: Senckenberg/Tränkner

possible framework conditions in the future to continue its important research at the highest level. In the past years, the state government has already contributed greatly to strengthening the cutting-edge research. And they were successful: Hesse is among the strongest federal states in Germany in regard to science and economy. This requires many research institutes such as Senckenberg."

The remodeling project was realized based on designs by the architect Peter Kulka and was executed under the project supervision of Gerd Mangel. Besides the improved research infrastructure and the creation of additional space, the project involved rendering the buildings – Jügelhaus and Arthur-von-Weinberg-Haus – as free of obstructions as possible, handling the building substance with special care, and complying with the requirements of historic preservation. The preservation of façades, original doors and windows, foyers, staircases, and stucco ceilings as well as selected individual rooms serves to illustrate the building's different time strata – the building complex's time of origin in 1907, interventions following the destruction during WWII in the early 1950s, and the res-



From left to right: Prof. Dr.-Ing. Dr. h. c. Matthias Kleiner, Undersecretary Wilfried Kraus, Prof. Dr. Birgitta Wolff, Dr. h. c. Beate Hæraeus, Minister President Volker Bouffier, Gerd Mangel, Prof. Dr. Dr. h. c. Volker Mosbrugger, Peter Kulka, and Prof. Dr. Andreas Mulch. Photo: Senckenberg/Tränkner

haping through remodeling and extension in the course of the most recent construction measure. Rooms protected as historical monuments such as the Parthenon Hall with the famous, recently restored replica of the Parthenon Frieze, the Blue Hall, and the Senate Hall were restored and at the same time up-

graded for use as conference rooms with the installation of media technology.

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Senckenberg Society for Nature Research

RESEARCH INFRASTRUCTURE

CARL BOSCH'S MOSS COLLECTION BEING DIGITIZED WITH FUNDS FROM THE KLAUS TSCHIRA FOUNDATION



Nobel laureate Carl Bosch was not only a gifted chemist, but also a passionate amateur botanist, geologist, and zoologist. His private moss herbarium alone comprised about 17,000 voucher specimens from the years 1817 to 1921. The major part of his regional collections is now in possession of Senckenberg in Frankfurt.

This collection's relevance becomes quickly apparent. "Short-term changes can be measured or observed; long-term changes such as global species extinction or the effects of climate change can often only be reconstructed on the basis of collections," explains Dr. Christian Printzen, curator at the Senckenberg Research Institute in Frankfurt, and he continues, "To this end, we need to further increase access to the information contained in these collections."

For this purpose, a project funded by the Klaus Tschira Foundation aims at speeding up the scientific development and digitization of this unique collection. The historic

moss voucher specimens, containing important evidence of long-term environmental changes, will thus become available online as well.

In the course of this project, funded with the



Herbarium voucher specimens from Carl Bosch's moss collection. Photo: Senckenberg

sum of 90,000 Euros, it is intended to preserve the moss collection in its original state by means of additional personnel resources over the next three years while at the same completing its digitization. In addition, the voucher specimens will be made available in

an online database.

Thus, the project not only honors the former "citizen scientist" Carl Bosch but all of today's citizen researchers as well. "The majority of our millions of collection objects were not obtained and compiled by specialists, but by amateurs – such as Carl Bosch. And without the continued involvement of volunteers, we would not be able to maintain and document these collections today. The entire project is therefore not only a boon to science but also a fine (and well-deserved) recognition of this volunteer engagement", explains a delighted Printzen.

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SCIENCE & SOCIETY // PUBLIC RELATIONS

SENCKENBERG PRIZE 2019: NEXT GENERATION



The "Senckenberg Prize for Nature Research" is awarded to Prof. Dr. Sandra Díaz; the "Senckenberg Prize for Engagement for Nature" goes to 18-year-old Xiuhtezcatl Martinez. Photo: Senckenberg/Tränkner



For the fifth time, the Senckenberg prize for outstanding achievements in nature research and for special personal engagement for the protection and preservation of nature was awarded during the Senckenberg Night. Prof. Dr. Sandra Díaz, a professor of biology at the National University of Córdoba, Argentina, received the Senckenberg Prize for Nature Research, endowed with 10,000 Euros, for her excellent, internationally visible achievements in nature research. Her work, which focusses on species communities and

ecosystems, has made a significant contribution toward improving our understanding of how the diversity of species and forms affects the ecosystem functions. The results of her research have been published in more than 100 scientific papers.

The Senckenberg Prize for Engagement for Nature, equally endowed with 10,000 Euros, was awarded to the 18-year-old director of the globally active "Earth Guardians" organization, climate activist, hip-hop artist, and author Xiuhtezcatl Martinez. With his campaigns such as "We The Future," Martinez has not only attracted the attention of his generation, but also that of decision-makers in politics and society. At the tender age of six, Martinez already became involved in climate protection; at the age of fifteen, he gave a rousing speech in front of the United Nations' General Assembly, calling for action. Currently, he is the principal plaintiff in a lawsuit filed by several young people against the Federal Government of the United States in an effort to incorporate climate protection in the federal statutes.

derverein (booster club) and organizer of the Senckenberg Night, explains: "In a joint effort, scientists and young people demand quick and concise action in the face of the continued deterioration of the state of the ecosystems. Politics and the economy are being held accountable to finally create the necessary framework conditions for climate-friendly and sustainable action. In this regard, Xiuhtezcatl Martinez is the leading voice for the youth of the United States of America. With the Senckenberg Prize for Engagement for Nature, the Senckenberg Gesellschaft für Naturforschung wishes to honor this admirable and encouraging engagement of the young generation!"

SGN-Contact:
Heike Spiller & Simone Loewen
Senckenberg Förderverein

Heike Spiller, chair of the Senckenberg För-

SCIENCE & SOCIETY // CITIZEN INVOLVEMENT

THE CITIZEN SCIENCE FORUM 2018



"Achieving more together" – this was the motto of the annual Citizen Science Forum that took place in September 2018 at the Senckenberg Biodiversity and Climate Research Center (SBiK-F) in Frankfurt am Main. The 130 participants from Germany, Austria, and Switzerland exchanged numerous experiences concerning networking and the structure of future citizen science research.

The participants placed special emphasis on the following central questions: What impact does Citizen Science have on science and society? How can young citizen scientists be inspired to get involved in research in the long run? What should the future of the citizen science community look like? All present at the forum shared the conviction that citizen science holds a great poten-

tial. "Properly conducted citizen science not only improves the research process, it also serves to move the results toward practical application," says the opening speaker Matthias Graf von Kielmannsegg, Undersecretary at the Federal Ministry for Education and Research. Based on this premise, new programs are intended to be established in 2019 to achieve sustainable support and funding for citizen science in Germany. Prof. Dr. Georg Zizka, Head of the Department of Botany and Molecular Evolution at Senckenberg, added that citizen science is on the upswing; however, this increase is limited to topics that are of interest to the citizens. In many other areas, new talent is sadly lacking.

Many opportunities for citizen scientists are also offered at Senckenberg itself: The pro-

ject "Looking for pupation stations – Blooming meadows for Saxony's butterflies," for example, gives citizen scientists an opportunity to improve species diversity among insects by getting involved in appropriate meadow maintenance activities. The citizen science project "Flora Frankfurt," on the other hand, emphasizes the biology and distribution of various plant species in Frankfurt.

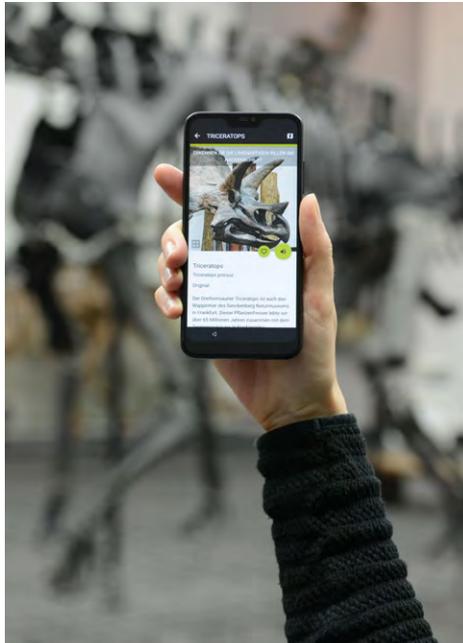
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SCIENCE & SOCIETY // MUSEUMS

SENCKENBERG APP GOES ONLINE



Multimedia in the Senckenberg Natural History Museum – this can now be experienced by the museum’s visitors with the aid of the Senckenberg app. With this app, the museum provides a fully revised media guide that contains a wealth of background information and many extras. “This is a further step toward creating added value for our visitors by using new digital strategies and making our wealth of knowledge accessible in an innovative way,” explains Prof. Dr. Katrin Böhning-Gaese, Member of Direktorium (Board) and Head of the “Science and Society” program. The app makes it possible to better explore the museum’s unique exhibits and specifically highlights exciting details. The visitors can hear stories about the exhibits and receive additional information via texts, images, and videos, depending on their individual thirst for knowledge. Maps and graphics place the exhibits in their geographic and temporal context. Links to current research results and information about preparation techniques allow a view behind the scenes of the Senckenberg Research Institute and Natural History Museum. A very special exhibit in the collection even comes to live via Augmented Reality: Ed-



The new Senckenberg app accompanies visitors via smartphone through the Natural History Museum. Photo: Senckenberg, Tränkner

montosaurus, the dinosaur mummy, is one of only two original specimens in the world preserved in such an excellent state. In the

app, the prehistoric giant rises from its glass case and greets a herd of its congeners roaming among the museum’s visitors. What makes this specimen particularly valuable for research are the fossilized impressions of its scaly skin, which were preserved due to mummification and are made visible for lay persons in the app.

With three guided tours, the app presents an overview of the most outstanding pieces in the collection: the Highlight Tour, lasting approx. 90 minutes; the Short Tour with 45 minutes; and the Family Tour with 60 minutes. Those who prefer to discover the museum according to their own rhythm can create their personalized tour on site or already prepare it from home or while on the road. The app also allows to mark and collect favorite specimens. Maps of the three levels easily indicate where to find which exhibition areas and objects.

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SCIENCE & SOCIETY // APPLICATION

SENCKENBERG SPIN-OFF PHYTOPROVE TAKES 2ND PRIZE IN THE START-UP COMPETITION



The Frankfurt start-up “Phytoprove Plant Analytics UG,” a spin-off of the Senckenberg Biodiversity and Climate Research Center, recently won second place in the business plan competition of the founder initiative Science4Life e.V. The company, active since February, specializes on the development of new processes for measuring the fertilization status and vitality of plants. This can lead to an increased yield and – at least equally important – prevent over-fertilizing.

Using an optical process, the newly developed devices detect any shortages in the plants’ supply of nutrients and water. The goal is to enable farmers, plant growers, parks departments, and tree farms as well as amateur gardeners to care for, water, and fertilize their plants in accordance with the plants’ requirements. This business idea now netted the company’s founders, Dr. Thomas Berberich and Dipl.-Biol. Daniel Weber, second prize in the “Science4Life Ven-



Awarding of the prize to Phytoprove Plant Analytics with the contest’s patrons. Prof. Dr. Jochen Maas – Manager for Research & Development at Sanofi in Germany; Dr. Thomas Berberich – Phytoprove; Dipl. Biologist Daniel Weber – Phytoprove, Dr. Philipp Peter Nimmermann – State Secretary in the Hessian Ministry for Economic Affairs, Energy, Transport and Housing (from left to right)

ture Cup" business plan competition. The "Science4Life Venture Cup" is Germany's largest business plan competition in the field of life sciences and is funded by the State of Hesse and Sanofi. It has been held for 21 years. This year, a total of 76 founder teams vied for the prestigious award in the competition's third phase. The judges assessed the business models, marketing strategies, competitiveness, financial planning, and prognosis for success of the competing companies.

The judges attested that the business concept of "Phytoprove Plant Analytics UG" shows scientific excellence and a high likeli-

hood of economic feasibility and awarded the company the 2nd place in the founder competition, endowed with 10,000 Euros. The Senckenberg Society for Nature Research congratulates the founder team on their success, since it illustrates the maxim "Theoria cum praxi," the motto of the Leibniz Society of which Senckenberg is a member, i.e., science for the benefit and good of humanity.

Additional information about Phytoprove and the competition:

<http://www.phytoprove.com>

<https://www.science4life.de>

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Phytoprove Pflanzenanalytik UG

SCIENCE & SOCIETY // CONSULTATION

RESEARCH INITIATIVE FOR THE PRESERVATION OF SPECIES DIVERSITY



In February 2019, the Federal Minister for Research, Anja Karliczek, introduced the new "Research Initiative for the Preservation of Species Diversity" by the Federal Ministry for Education and Research (BMBF) in Berlin. Led by Senckenberg, the initiative will significantly advance research in the field of biodiversity, streamline the German research activities, and make a sustainable contribution toward slowing down the continuing loss of biological diversity.

The loss of species diversity has reached alarming proportions in the past decades. Experts estimate that the average rate of extinction now exceeds the value typically found in evolution by a factor of one hundred to one thousand. In Germany, almost one in three wildflower species is threatened with extinction, including flowers such as arnica or common corn-cockle. Other particularly affected groups include many bird and insect species, notably many species of wild bees. Since 1980, the populations of farmland birds in the EU have decreased by more than 50 percent. Species such as lapwing or whinchat have already disappeared from many regions. Thus, loss of species diversity today is an underrated threat and a problem as pressing as climate change. Despite multiple, national and international efforts, this negative trend appears to continue unchecked. Part of the reason for this are large gaps in our knowledge that stand in the way of an increased mobilization of the public as well as targeted and efficient actions. While many of the causes of the species decline are known, including the loss of habitat, cli-



Seriously endangered: the Apollo butterfly (*Parnassius apollo*).
Photo: Senckenberg / Schmitt

mate change, and the overuse of natural resources, our knowledge of the complex interactions between these causes and the full extent of the species decline is still fragmentary.

Our current state of knowledge already enables the implementation of measures for species and landscape protection. For example, the sturgeon is reintroduced in the Elbe river, and a concept is being developed for the stabilization and recovery of the arnica. However, in many cases there is a lack of reliable decision-making bases and management instruments for dealing with biological diversity in overarching areas such as politics and economy as well as in individual action fields such as consumption, nutrition, and housing. The research is intended to contribute to closing these gaps in our knowledge before the species loss could cross a critical threshold. By signing the Convention on Biological Diversity (CBD), Germany has committed to pursue this goal on an international level. To this end, the

new research initiative will speed up the documentation of the state of species diversity by developing innovative technologies. In addition, it aims at gaining a deeper systemic understanding of biodiversity changes and developing effective options for action in conjunction with applied users.

The main parts of the initiative are based on the "Frankfurt Declaration" – a set of recommendations by a number of renowned biodiversity researchers. The Federal Ministry for Education and Research (BMBF) will support the "Research Initiative for the Preservation of Species Diversity" with a total of 200 million Euros in the coming years. The initiative is part of the BMBF framework program "Research for Sustainable Development" (FONA) and contributes to the "National Strategy for Biological Diversity" (NBS) and the High-tech Strategy 2025 by the Federal Government.

Frankfurt Declaration:

www.senckenberg.de/frankfurtererklaerung

Information about the flagship initiative can be found at:

www.bmbf.de/de/biodiversitaet-forschung-fuer-die-artenvielfalt-343.html

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Senckenberg Society for Nature Research

PEOPLE

STEFFEN PAULS: PROFESSOR FOR GENERAL ENTOMOLOGY

The Head of the Department of Terrestrial Zoology and the Section Entomology III at the Senckenberg Research Institute and Natural History Museum in Frankfurt am Main, PD Dr. Steffen Pauls, was appointed Professor for General Entomology at the Justus-Liebig University Gießen (JLU) as of 1 January 2019.

This joint appointment serves to further expand the close cooperation between the University of Gießen and the Senckenberg Society for Nature Research in the area of biodiversity and insect research. "I am very excited about this joint appointment, which strengthens our biodiversity research in the realm of insects – an urgently needed research field, particularly in this time of massive insect die-backs," says JLU President Prof. Dr. Joybrato Mukherjee. "Our students and young scientists will also benefit greatly from PD Dr. Pauls' special expertise and the contacts provided by a close link with the Senckenberg Gesellschaft für Naturforschung." The University of Gießen and the Sencken-

berg Society for Nature Research are connected by numerous research projects. "For a long time now, Senckenberg has successfully cooperated with scientists from the JLU," says Prof. Dr. Dr. h.c. Volker Mosbrugger, the SGN's Director General. "The joint appointment of Steffen Pauls is a very welcome step toward the further expansion and formalization of this cooperation between the JLU and Senckenberg in the highly topical field of biodiversity research. I am convinced that the joint appointment will provide an important new impetus in this area."

Dr. Pauls' joint appointment follows the "Jülich model" in which the appointees are granted leave to pursue their managerial responsibilities in a non-university research facility. However, in addition to his work as a leading scientist at the Senckenberg Research Institute and Natural History Museum in Frankfurt, Pauls will also be involved in the teaching and education of young scientists in the field of environmental sciences at JLU. He will expand the curriculum in the Department of Agricultural Science, Ecotro-

phology and Environmental Management with courses regarding his specialist field, the molecular and classic diversity research in insects.



Excited about the joint appointment of PD Dr. Steffen Pauls at the JLU and the Senckenberg Society for Nature Research (from left to right): Prof. Dr. Klaus Eder, Dean of the Department of Agricultural Science, Ecotrophology and Environmental Management at the JLU, JLU President Prof. Dr. Joybrato Mukherjee, PD Dr. Steffen Pauls, JLU Vice President Prof. Dr. Peter Kämpfer, and Prof. Dr. Andreas Mulch, Deputy Director General of the Senckenberg Society for Nature Research. Photo: Rolf K. Wegst

PEOPLE

ALUMNI PORTRAIT: A LOOK INTO THE PAST

Gabriel de Souza Ferreira, a doctoral student at the University of Sao Paulo in Brazil, is an evolutionary biologist who studies the change of organisms over time. His work focusses on reptiles, in particular on turtles. In cooperation with PD Dr. Ingmar Werneburg at the Senckenberg Centre for Human Evolution and Palaeoenvironment (HEP Tübingen), Gabriel studies macro-evolutionary processes in these fascinating animals, using fossil material and a diverse portfolio of the latest function-morphological and phylogenetic methods. For this purpose, he visited the HEP from December 2016 until November 2017.

For Gabriel, the cooperation with Senckenberg is invaluable, since it provides him with access to internationally renowned expertise and a modern infrastructure. His time in Tübingen left a lasting impression on Gabriel and gave his research a new direction. Of particular value for him is the international flair of Prof. Dr. Madelaine Böhme's working group in which he conducted part of his doctoral work. Gabriel recommends that other scientists should seek cooperation with Senckenberg as well, since he considers Senckenberg to be a diverse, well-structured and productive research institution.



Gabriel de Souza Ferreira Photo: Private