

Veterinary drugs in the soil and water

In addition to nutrients that promote plant growth, liquid manure also contains residues of veterinary medicinal products. A new team of junior researchers led by Oldenburg hydrogeologist Dr. Victoria Burke is studying the effects these residues have on soil where manure is used and also their impact on the groundwater from which we source our drinking water. The Kurt Eberhard Bode foundation is providing a total of 460,000 euros in funding for the research group at the University's Institute for Biology and Environmental Sciences. The funding period ends in 2019.

The use of industrial fertilisers such as liquid manure on areas used for agriculture is considered to be one of the principal ways in which veterinary drug residues are released into

the environment. Animals excrete significant amounts of these drugs – in some cases up to 100 percent of the dose – either unchanged or as breakdown products. A certain amount is retained in the ground (initially), some of it seeps away, and the rain washes some of it into the deeper soil layers, with each substance behaving differently in the process. Together with two PhD candidates Burke wants to find out which drug residues quickly make their way into the groundwater, how, in what concentration – and also which substances are retained in the unsaturated upper layers either temporarily or for longer periods of time. Their research will also examine how these tracers are broken down. What happens with antibiotics for example? How quickly are they broken down in soil

and in groundwater? Which drugs leave residues in the ground, meaning that – depending on the concentration – the local water supplier needs to take action? Water suppliers must adhere to stringent limits here because studies have proven that drugs and other chemical residues have negative effects on humans, animals and the environment. In experiments of varying scales, from laboratory tests to field tests on a section of land provided by the Lower Saxony Chamber of Agriculture, Burke hopes to gain an understanding of the entire process, from the point at which the residues enter the ground to the point where they reach the groundwater. The research will also focus on the question of how laboratory results can be designed to better reflect events as they occur in nature.



Hydrogeologist Victoria Burke: tracing the pathways of veterinary drugs at three different levels of analysis.

Traffic safety on land and waterways

The "Interdisciplinary Research Centre on Safety-Critical Systems Engineering for Socio-Technical Systems" at Oldenburg University has secured an initial sum of one million euros in follow-up funding from the State of Lower Saxony. The team of scientists in this joint project began their research into safety in human interactions with complex technical systems in 2013. The key goals of the second 18-month funding period are to expand knowledge in basic research and to build up a unique pan-European research network in the field of safety-critical systems. The University and its affiliated OFFIS institute are cooperating with the DLR

Institute of Transportation Systems in Braunschweig and the competence network SafeTRANS on the project. The basic research already covers a broad spectrum: one project is studying how motor vehicles can proactively compensate for driver weaknesses, while another is analysing the potential risks of new methods for safe ship navigation. A third project is examining safety issues in highly interconnected socio-technical systems, and in addition there are research projects on the safe design of offshore operations and on adaptive integrated ship bridges which are able to adjust to different nautical tasks.

New insights into the theory of relativity

Fresh impetus for research in the field of gravitational physics in north-west Germany: the German Research Foundation (DFG) has approved the continuation of the Research Training Group "Models of Gravity". The group will receive a total of 4.2 million euros in funding. It is led by Prof. Dr. Jutta Kunz of Oldenburg University's Institute for Physics and Prof. Dr. Claus Lämmerzahl of the Center of Applied Space Technology and Microgravity at

the University of Bremen. Gravitational physics has become an increasingly topical and exciting field of research in recent years thanks to confirmation of the existence of gravitational waves and the fact that these are created through the merging of two stellar-mass black holes. The scientists hope to gain fresh insights about the equivalence principle and by extension about the foundational basis of the theory of relativity.

Kale prevents cancer

Kale is considerably more effective at protecting against cancer than other vegetable varieties, a team of Oldenburg researchers led by Prof. Dr. Dirk Albach of the Institute for Biology and Environmental Sciences working together with chemists from the Jacobs University Bremen has discovered. They were looking for kale varieties that were low in bitter-tasting compounds but rich in cancer-preventing substances, and during this search

they made an amazing discovery: northern German kale varieties contain ten times more cancer-preventing substances than broccoli, the front runner up to now. Kale owes its cancer-preventing properties to its high content of glucosinolates, which the human organism breaks down into sulphur compounds. Certain sulphur compounds have been proven to have chemopreventive effects, which means they help protect against cancer.

Four new marine research groups

Oldenburg University is in charge of four out of six new groups in Lower Saxony that are engaged in marine and coastal research. Two of these projects involve members of the general public in the research.

The four new research groups will receive 5.1 million euros in funding provided by the Ministry of Science and Culture of Lower Saxony and the Volkswagen Foundation's "Niedersächsisches Vorab" fund. Together with colleagues from the Institute for Biology and Environmental Sciences, as well as cooperation partners both inside and outside Germany, by 2020 the scientists at the Institute for Chemistry and Biology of the Marine Environment (ICBM) hope to find answers to a number of questions.

A project led by Prof. Dr. Oliver Zielinski is investigating whether the amount of light penetrating the water in coastal areas is decreasing, and what impact this would have on the North Sea coast's ecosystem. Citizens can contribute to the project by providing sea colour data obtained using the EyeOnWater app specially developed for this purpose.

To study the sources, dispersal pathways and contamination zones of macroplastics in Germany's North Sea coastal areas, another research team led by Prof. Dr. Jörg-Olaf Wolff is putting some 100,000 pieces of wood into the water. The team would like people who find these "drifters" to report the location online at macroplastics.de.

A team of researchers led by Prof. Dr. Helmut Hillebrand and Prof. Dr. Bettina Meyer is studying the impact on a marine ecosystem when one marine animal species gradually ousts another from the system as a result of climatic factors in the Southern Sea. The fourth research team, headed by Prof. Dr. Thorsten Dittmar and Dr. Hannelore Waska, is focusing on groundwater and the underground transport of nutrients from land to sea.

High-tech for cutting-edge research

Large machines are indispensable for top-level research. In 2015 the University received funds to the tune of several million euros to acquire high-end technology. Most of the money came from federal and state budgets.

Chemists and physicists at Oldenburg University will now be able to use a new X-Ray Photoelectron Spectrometer (XPS) for their research. This device performs chemical analyses of solid object surfaces – an important function in materials research. The layers it analyses are five nanometres thick, or just one ten-thousandth the diameter of a hair. In a group led by Prof. Dr. Gunther Wittstock, professor of chemistry, Oldenburg scientists are using this technology among other things to

optimise layer structures in batteries and solar cells.

The University has also acquired two new supercomputers. Together “CARL” and “EDDY” are among the fastest supercomputers in the world and one of the most powerful computer clusters in Germany’s university research landscape. Around 200 scientists from more than 30 research groups are using the newly available computing power for numerical simulations. The computers receive funding from two separate budgets: the German Research Foundation (DFG) and the State of Lower Saxony provided the funds for one of them while the ForWind Centre for Wind Energy Research received the funding

to purchase the second from the Federal Ministry for Economic Affairs and Energy. The total investment amount is five million euros.

The University’s scientists in the fields of psychology and medicine will be able to use the new magnetic resonance imaging (MRI) scanner at the School of Medicine and Health Sciences (Faculty VI) for their research. The MRI scanner has already been used for a study on the effects of chronic pain which was carried out by the University in collaboration with the Klinikum Oldenburg. The scanner is also an important new research tool for the “Hearing4all” Cluster of Excellence, which can use it for imaging brain structures involved in the hearing process.

Education for Sustainability: Four new projects

Making socially challenging educational topics accessible for youths is the goal of four closely interconnected projects at the University which will receive a total of 800,000 euros in funds from the German Federal Environmental Foundation (DBU). The educational materials and concepts developed within these projects are to be made available to school and non-school educational establishments.

Technology educationalist Prof. Dr. Peter Röben and project manager Dr. Katharina Dutz view teaching pupils and trainee teachers the knowledge and skills necessary to carry out repairs as an integral component of education in technology and computer science aimed at sustainability. In a project titled RETIBNE, and together with computer science educationalist Prof. Dr. Ira Diethelm, they are developing exercises involving repairs to help pupils acquire the practical skills necessary to carry out such tasks.

Physics educationalist Prof. Dr. Michael Komorek sees the discussion of the physical mechanisms at work in mud

flats and in coastal areas as an important task in schools and non-school learning environments. In his project aspects of marine and coastal dynamics in the context of climate change will be analysed and prepared as teaching content and then integrated into the educational activities of the Lower Saxony Wadden Sea National Park.

Chemistry educationalist Prof. Dr. Verena Pietzner wants lessons with a greater emphasis on vocational orientation. In her school laboratory CHEMOL, pupils are given special exercises that serve as an introduction to careers in trade and industry, landscape conservation, administration and environmental analysis. Biology educationalist Prof. Dr. Corinna Hößle and her colleagues Anja Wübben and Dr. Holger Winkler advocate transfer of knowledge about current marine research in schools, teacher training and national park facilities. They aim to build up a network that connects the University with national park facilities and to launch innovative educational initiatives at the “Learning Laboratory Wadden Sea”.

“Hearing for all”

Excellent hearing research: the “Hearing4all” Cluster of Excellence competed successfully in the „Cutting-Edge Research in Lower Saxony“ competition organised by the Lower Saxony Ministry for Science and Culture and the foundation VolkswagenStiftung. With the one million euros in funding they secured, the researchers from Oldenburg and Hanover plan to begin research in new fields and at the same time work on boosting the Cluster’s chances of receiving follow-on funding in the German Universities Excellence Initiative.

The new two-year research unit “Hearing for all” aims to bridge the gap between specialised hearing research and a sustained impact on patients’ everyday lives. To this end the researchers are focusing on three important and pioneering challenges: audiological precision medicine, improved machine processing of language, and new materials and control mechanisms for the hearing aids of the future. Prof. Dr. Birger Kollmeier is the coordinator of the Oldenburg research unit.

Junior Research Group: How knowledge is created through music

With the support of her own junior research group and funding from the German Research Foundation’s prestigious Emmy Noether Programme, musicologist Dr. Anna Langenbruch is investigating “The History of Music on the Stage”. The group will receive a total of 1.1 million euros in funding from the five-year programme. With the addition of musicologists and drama experts Daniel Samaga and Clémence Schupp, who joined Langenbruch’s project in August, the team is now complete.

The musicologists are studying how musical history is reconstructed in musical theatre – for example in operas, operettas and musicals. There are hundreds of works that deal with musicians such as Mozart, Farinelli, Clara Schumann, Edith Piaf or the Beatles. These historic figures have frequently been presented on stage as dramatis

personae themselves. In such productions the history of music is presented and experienced in a very special way: it is sung, spoken, played or composed. In this way the history of music itself becomes an aesthetic event. The researchers are interested in examining how this form of production of knowledge functions, or in other words how knowledge about music is conveyed through the medium of music. Through the project they hope to gain new insights for the historiography of music, as well as for the historiography of the arts in general.

The project is divided into three parts, each with their own specific emphasis as regards content and method. Under the heading “Music|History|Theatre” Anna Langenbruch is exploring the history of musico-historical knowledge production. Her methodological reflections are based on the analysis of

selected case studies stretching across time and space, from the Parisian beginnings of historiographic musical theatre in the 18th century and the problematic nature of voice historiography to the stage expertise of contemporary opera houses.

In the sub-project “Mozart on Stage”, Daniel Samaga is analysing typical narrative strategies of historiographic musical theatre using the example of Wolfgang Amadeus Mozart, a central figure in musical theatre history. The third sub-project, “The History of Music in Popular Musical Theatre from 1970 Onwards”, focuses on perception processes. Here, Clémence Schupp is using a selection of productions about historic chanson and jazz singers to examine how the actors involved in these productions experience and shape the confrontation with the history of music on stage.



A prestigious programme for junior researchers: Anna Langebruch has put together her own team of researchers.