What Do Rhododendrons, Cocoa Beans and Rare Earth Elements Have to Do with Bremen?
Scientists are researching new medications based on rhododendrons; they are decoding cocoa beans and helping to improve cultivation conditions; they are extracting digital gold that is produced with the aid of rare earth elements: Join Us – and explore the world of Jacobs University. Welcome to the first edition of our new magazine “Join Us – We Deliver Global Talents.”

We are pleased to introduce you to people who shape the face of our university: with their commitment, their talent, their knowledge, and their demonstrated sense of responsibility for our global society.

If you are looking for interculturally oriented young people from all over the world – join us. If you want to prepare your employees to meet the great challenges of our time – join us. And if you need a partner for a research project – then join us!

At the Jacobs University Careers Fair 2016, we engaged in an intensive give-and-take with our corporate partners. In the following pages, you can read about how companies see us. Have fun reading our magazine – we hope that we have been able to turn the motto of our magazine into reality: JoinUs!

The Healing Power of the Rhododendron

Multiresistant bacteria are one of the great challenges of our time. A team headed by Professor Matthias Ullrich is researching new antibiotics – based on a known plant.

In parks, dog owners have to keep their pets on a leash; animal lovers are happy to comply. Because what they get to see and smell in Bremen’s Rhododendron Park, particularly in springtime, is a thing of rare beauty. Nearly 600 wild varieties and over 3,000 cultivars of the plant, whose name means “rose tree,” transform the landscape into a waving sea of splendid color.

The Rhododendron Park is an attraction, not only for strollers. Scientists at Jacobs University are also attracted to the world’s largest collection of the genetic variety of rhododendron. For approximately four years, a team under microbiologist Matthias Ullrich has been researching whether the plants might contain active substances for new drugs, for antibiotics, or for cancer therapy. The findings so far are more than encouraging: “We are on the trail of several new kinds of substances, which could some day be used as antibiotics,” says Professor Ullrich.

Even Roman sources report of the intoxicating effect of honey from the plant, which originally comes from the Himalayas. Extracts from its leaves and roots were used in the traditional medicine of places like India, Turkey, and Indonesia to heal infections, lower fever, or relieve feelings of malaise. But until now, there has never been an intensive scientific analysis of its constituents and their effects.

Ullrich is not doing it all alone; as he is part of an interdisciplinary team working together on samples from rhododendrons. The geneticist, Professor Dirk Albach, is analyzing the genetic material and determining its exact nature. The natural substance chemist, Professor Nikolai Kuhnert, is identifying the substances contained in the plants. The cell biologist, Professor Klaudia Brix, is examining their toxic characteristics, while Ullrich is testing how the constituents react to bacteria.

“For four scientists from different disciplines working together on one topic there is the character of a pilot project,” emphasizes Ullrich – and attributes it to the conditions at Jacobs University. “The university is built on interdisciplinary. We are small, we support each other, and we work together under one roof in the Center for Molecular Life Sciences.”

For its studies, the group of four needs only a few leaves from the plant. They are crushed in a mortar with liquid nitrogen. The result is a greenish powder, which is concentrated using methanol and then examined further. So far the researchers have extracted about 600 different substances. “It’s a little like looking for a needle in a haystack,” admits Klaudia Brix. The biologists have already tested 200 different varieties.

“Some have a clear antibacterial effect,” says Ullrich. In the process, the substances are also tested to determine whether they are safe for human cells. The hope that one of the substances could inhibit cell division, and thus act as an anticancer agent, has so far not been realized.

In any case, the focus of the research is on the search for a new plant-based antibiotic. The need for such medications is enormous. More and more germs are developing resistance to the old drugs, especially in hospitals. “This is a huge problem,” says Ullrich.

It will take a while before new medications based on the rhododendron undergo clinical trials. “We know what the new substances can do. But we still do not understand how they work.” Additional testing is thus required before a pharmacological analysis can be done by industrial partners. Anyway, the Rhododendron Park in Bremen need not fear a clear cut. If Ullrich and his team prove successful, the new substance will be produced artificially – in a laboratory.

Research for People

Whether for the development of fuel cells without platinum or medicine from the sea, Jacobs University wants to use its research to make a contribution to solving worldwide problems. In their work, the scientists concentrate on three focus areas:

- Mobility – of people, goods, and information: exports from areas such as computer science, logistics, mathematics, robotics, and psychology work together to analyze the movement of people, goods, and information worldwide. The goal is to better understand the increasingly complex interactions and thus to control them more efficiently.
- Health – focus on bioactive substances: the goal is to find solutions (for instance, to global health problems) that permit the development of new drugs to fight multiresistant pathogens. The analysis focuses on bioactive substances of natural and synthetic origin.
- Diversity – in modern societies, researchers are studying the variety of human behavior from different perspectives, from the cell as a microunit to the structure of entire countries, international organizations, or companies. In all the focal areas, the scientists work in transdisciplinary teams in state-of-the-art laboratories.

Their own research efforts are supplemented by cooperative international projects, including with Universitat Potsdam-Spandau, the University of Oxford, and the University of Brest.
The Gold Digger

Never before in human history has so much data been created so quickly. It is increasingly becoming a valuable resource. At the same time, however, the rising flood of data is making it difficult to extract this "gold" of the digital revolution. Dr. Peter Baumann, Professor of Computer Science at Bremen's Jacobs University is making data usable — for instance, for better prediction of natural events. Born in 1961, he is a university lecturer, a scientist, and an entrepreneur.

Rasdaman stands for a multiple-award-winning, internationally successful software that visualizes, standardizes, processes, and analyzes multidimensional data structures known as arrays. "In research, you don't normally do any large-scale software development," says Baumann. "You develop ideas, try them out, write a paper. Often there is no sustainability; things get lost. We don't want that."

The Bavarian sees himself as a scientist and engineer. It is not enough for him to think a topic through; he also wants to offer practical, usable solutions. "The more diversity they can be used, the better." For instance, his company with its seven employees works closely with Jacobs University to provide an open-source version of Rasdaman. Together, the two partners continuously develop the technology further.

Baumann works as a kind of explorer in the infinite expanse of the data universe. He visualizes and analyzes data to unlock its secrets. In the process, he is always dealing with larger volumes of three-, four-, and five-dimensional data. The data comes from satellites and sensors that scan the earth at different times and places. It contains data on vegetation, analyses of oceans, or recordings of structures such as roofs. In addition, computer-generated data (e.g., weather forecasts) are administered and analyzed using Rasdaman.

Combined together and networked, this data provides new insights on various subjects — for instance, the spread of wildfires in California, changes in arctic ice, the development of the size of refugee camps, or predictions of impending water shortages. EarthServer is the name of the project, which is coordinated by Jacobs University, is sponsored by the EU, and brings together partners from Europe, Australia, and the USA.

Rasdaman will even be venturing into space, since the European Space Agency will install the program on one of its satellites. The project is called ORBIDANSE (Orbital Big Data Analytics Service), and Baumann explains it as follows: "Data can be transmitted by a satellite only when it is passing over a ground station. Such a time window is narrow, too narrow if there are transmission errors. Data can be lost. Now, with the help of Rasdaman, the satellite will be able to answer concrete questions, such as after the spread of an oil slick in the Gulf of Mexico, for the very first time. Such detailed questions provide more precise and thus shorter answers, which can then also be transmitted more reliably within the given time window. This is an entirely new quality!"

The passionate salsa dancer has been conducting research and teaching at Jacobs University since 2004. It was an opportunity to help build something new that drew him to Bremen. And it is the internationality and interdisciplinarity of the private research university that never stop motivating and inspiring him. "As a computer scientist, you normally sit in front of a monitor and think about something. Here I come together with geologists and brain researchers, with cosmologists and seismologists. Personally, that is very enriching to me; and scientifically, it moves us all forward."

Enriching — he also feels enriched by the students. They come from a good dozen different countries. Baumann integrates them into his research projects at an early point. Like him, they are also not interested in mere theory, but in applications and solutions. That makes them sought-after graduates.

After graduation, about one-third of them go into research and two-thirds to industry, including several who go to Google, the mecca for many young computer scientists. Baumann's research interests merge with one of the newest courses of study at Jacobs University: Data Engineering. To the degree that the flood of data swells, people are needed who can analyze and interpret it. Computer scientists, of course, would understand a great deal about computers and algorithms, says Baumann, but they do not necessarily know enough about the interpretation of the data — for instance, in the geosciences. Today, interdisciplinary skills are needed. "That is exactly the approach of Jacobs University. We train these international bridge builders between the worlds," says Peter Baumann.

Jacobs University prepared me for my career in many ways — to know how to work with people from all over the world and to understand as well as handle complex situations. I am now working at Microsoft, and I have Jacobs University and the opportunities offered to me here to thank for that.

We train interdisciplinary bridge builders between the worlds.

Prof. Dr. Peter Baumann
Professor of Computer Science

We are mainly looking for students in the areas of software technology and computer science. In the past, we had great success and hope that we can continue it this year and in the future.

The terms "Choice, Core, and Career" are contained in the innovative 3-C-Model of Jacobs University. It applies to all Bachelor Programs and gives students a greater freedom of choice: The model has a modular structure; a practical orientation, and conveys all the key qualifications needed for a successful professional career. In the first year, the Choice Year, students choose three modules from a wide interdisciplinary selection. It is not until the second year, the Core Year, that they commit to their degree major. The in-depth phase can be combined with a module from a complementary discipline. The third year, the Career Year, includes a six-month internship or semester abroad at a partner university. Overall, Jacobs University offers 16 Bachelor degrees as well as two one-year preparatory courses: the Foundation Year for national and internation- al students beginning their studies and the Medical Preparatory Program for aspiring medical students.

Bachelor Programs and Curriculum

- Biochemistry and Cell Biology
- Chemistry
- Computer Science
- Earth & Environmental Sciences
- Electrical and Computer Engineering
- Global Economics & Management
- Industrial Engineering & Management
- Integrated Social Sciences
- Intelligent Mobile Systems
- International Business Administration
- International Relations: Politics and History
- Mathematics
- Medical Chemistry and Chemical Biology
- Medical Natural Sciences (Preparatory Program)
- Physics
- Psychology

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Living Diversity

Diversity is power. Specializing in network optimization in production and logistics, Professor Julia Bendul is convinced of that. She pools the knowledge of technical experts in interdisciplinary teams, transferring methods from other disciplines to logistics; her students come from different cultural environments. The diversity helps to describe – and solve – problems.

When Julia Bendul looks back on her own days at college, one thing stands out: “We were all the same!” The 33-year-old from Verden, Germany, studied industrial engineering at the University of Bremen. She was surrounded by mechanical engineers and economists who were all more or less on the male domain of logistics, an area that has a lot to do with mathematics, physics, and mechanical engineering. That is unfortunate, she believes, but also feels the winds of change: “I think it is great that half the students in the industrial engineering program are female.”

At Jacobs University, Julia Bendul knows each one of her students. She meets with them several times a week to talk, even about private things. They live on campus. They spend their free time with each other, participate in one of the numerous clubs, in theater, the rowing team, or choir. “That is unique in Germany,” says Julia Bendul enthusiastically.

In her work, she not only pursues interdisciplinarity, but even applies methods from other disciplines to logistics. In this way, knowledge of metabolic processes in biology contributes to predictions of the sustainability of machines to risks. A method from physics regarding synchronization makes it possible to better estimate the ability of a company to deliver on time. “We always deal with real problems. We don’t research things no one needs – even when the application is still years away.”

This solution-based approach is also appreciated by her students, for whom a six-month internship is mandatory. They often write their final paper in cooperation with companies. “When I ask them at the start of their course of study where they would like to work someday, they usually name one of the big names in the industry,” says Julia Bendul. “That changes over time. Bendul increasingly brings them into contact with mid-sized companies. “They are often very excited about the opportunities they have there.” She believes that her international students can be particularly valuable for smaller and mid-sized companies – for instance, when entering new markets.

In order to develop solutions, the educational system must react to technological innovations, finds Julia Bendul. A good two decades ago, this led to the creation of the profession of mechatronics engineer, which combines mechanical and electronic engineering. In shaping and controlling the digital revolution, other disciplinary boundaries also had to be overcome – such as through the increasing integration of computer scientists and psychologists. Professor Julia Bendul believes that Jacobs University is on the right path.

The talents are very diverse. On the one hand, there are people with a background in natural or engineering science, who have a very analytical way of thinking; on the other hand, there are lots with a talent for business. I am especially impressed by the variety. You meet people from all over the world – from China, Latin America, Europe – and they are very motivated and focused on their personal development and their career. That is something I like a lot!

Everyone has strengths and weaknesses. The fascinating thing is the combination – seeing how solutions develop together.

Additional Information
www.pln-workgroup.user.jacobs-university.de
www.scem-program.user.jacobs-university.de
www.iem-program.user.jacobs-university.de
Challenges and opportunities are both a given in Jacobs University’s Master Programs and Doctorates.

All Master Programs are based on three principles: Core, Career, and Research. While studying for their Master degree, students are familiarized with fundamental and advanced contents in their area of study. In addition, they get the qualifications important for their professional career and participate in scientific and industrial projects, about which they write their thesis. All the programs encompass different learning platforms such as seminars, lectures, workshops, field trips, and lab work. The students are encouraged to escape the narrow bounds of their specific discipline and to view their topic from an interdisciplinary perspective.

In addition, doctoral candidates can get their degree in a wide variety of areas such as biochemical engineering, computer science, geosciences, international logistics, and psychology. At the Bremen International Graduate School Social Sciences (BiGSsS), doctoral candidates in the social sciences can choose from an excellent range of courses.

Join Us

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Master Programs and Doctorates

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Computational Life Science
Data Engineering
Psychology
Supply Chain Engineering and Management

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Today, the professor’s lectures and work groups are attended by young people from places like China, the USA, Romania, India, Columbia, and Germany. They include aspiring biologists, computer scientists, electronic engineers, and industrial engineers. She offers a course together with a bioinformatics professor, and her research naturally also has an interdisciplinary slant: “This diversity, this variety – I think it’s great!” The idea that complex problems should not be viewed from just one perspective, that more can be achieved by working together, she conveys this insight to her students from the very beginning. When the group works concerns an analysis of a logistics chain, they are often very excited about the opportunities they have there.” She believes that
Being named is a great honor. But it is no reason to get a big head,” says Cornel Amariei, who got his degree in Electrical Engineering and Computer Science at the international university in 2015. In 2014, the now 22-year-old, together with his team, won the Jacobs Startup Competition, a competition for entrepreneurs, at which the glasses project was first presented under the name of Lumen. “My successes would never have been possible without Jacobs University. The environment is unbelievably enriching,” says the young Romanian. “Many ideas, including Lumen, developed in discussions with fellow students and instructors. Studying there was the best experience of my life.”

For the first time, the prestigious US business magazine Forbes has compiled a list of the 30 most influential people in Europe under 30 years of age. The “30 under 30” include Cornel Amariei, who during his course of study at Jacobs University developed glasses for the vision-impaired that scan the environment and describe the surroundings to the wearer.

For ten sectors, Forbes created a list of the brightest minds; Cornel Amariei was named for the area of “industry.” It is true, he now works for the automotive supplier Continental as a Lead Engineer. There, among other things, he works on autonomous driving and applied for ten patents within a month. Even so, he is continuing the Lumen project. “My greatest goal is to help the vision-impaired with Lumen. In the meantime, the technology has advanced greatly, and we will soon be able to test the glasses under real conditions,” explains Amariei, who is currently fulfilling another dream – getting his pilot’s license.

The Jacobs University Scholarship Fund is custom-tailored for foundations, private supporters, and companies who want to support these world citizens in a manner that matches their goals and needs – particularly talents from threshold and developing countries, women studying MINT subjects, and people with special needs. The subsidies are awarded in accordance with need and performance. The selection of the stipend recipients is based on demonstrated performance potential and attested financial need.
In the WDN – WISE Demographic Network, scientists and companies are working together to develop solutions for demography-related personnel requirements. What this can look like is shown by the multiple-award-winning special exhibition “Ey Alter – du kannst dich mal kennenlernen” [Hey Dude – get to know yourself] at Universum® Bremen.

While the effects of demographic change on the world of work, and also on society as a whole, are one of the focal points of research at Jacobs University. For instance, the team of Professor Siona Lippke, an expert in health psychology, and Professor Christian Stamov Roßnagel, working in organization psychology, are developing innovative concepts for personnel structures and development in the context of the research project Demowa. Research is under way on the opportunities of demographic change. In the “Tunnel of prejudices,” visitors are confronted with their own image of age. “It’s all in your head” shows the change in thinking over the course of a life. In “Cafe Future,” projects and recipes for a new age mix are served, and visitors are shown how collaboration between young and old can actually look like. Other parts of the exhibition include: “Room of questions,” “Your age,” “Your potential,” and “Your team.”

With the WDN – WISE Demographic Network, Jacobs University provides a platform for corporate decision-makers and personnel managers to share the latest research results, best-practice examples, and experience. In developing strategies, the scientists utilize knowledge from the areas of brain research, psychology, sociology, political science, medicine, and business administration. The WDN was founded by Deutsche Bahn, Daimler, the energy concern EnBW, and Volkswagen, among others. Since then, the network has grown to include Werder Bremen, HUK Coburg, Vorwerk, the German Federal Labor Office (BfA), Allianz, and others. Interested companies are always welcome.

Demographic change is transforming our society. The proportion of older people is rising; fewer children are being born; and the average age of employees is increasing. As age increases, there are different illnesses, and the risk of chronic degenerative diseases, such as heart disease or joint degeneration, is on the increase. This requires management to develop forward-looking strategies in order to adapt. This can include the optimization of workplace design, active compa- ny health management, with fitness and nutritional offerings, more flexibility in workplace design, and qualification measures like “IQ.”

However, it is wrong to believe that people become less innovative and pro- ductive when they get older. “There are shifts in performance; physical work becomes more strenuous,” says Professor Sven Voelpel. “But this is compensated for by experience and compulsion.”

A Business Partner

Jacobs University offers companies a wide variety of options to profit from its competen- cies, infrastructures, and values. It is already working closely with numerous well-known companies from the DAX, mid-sized business, and Fortune 500 segment – for instance, with Barry Callebaut, the world’s largest producer of chocolate and cocoa, in deciphering the more than 10,000 ingredients in cocoa beans.

As a nonprofit company, Jacobs University can be highly flexible and react quickly to the wishes of partners from business. This is being done, for example, in the area of executive education through custom-tailored programs and workshops on current topics such as managerial skills for specialists. Here, experts who have a background (e.g. as engineers, scientists, or computer scientists) are prepared for future management roles.

Likewise, future topics including “Big data methods and potentials” or “Industry 4.0: technologies and business models” are dealt with together with corporate partners in order to prepare employees of different levels (from high potential to CEO) for future challenges. The Connecting Worlds program is designed for companies that are not only active abroad but would also like to send their employees to Germany for a while. Jacobs University and complete an internship at a German company. For challenges such as CSR and employer branding, Jacobs University can also offer true added value and create individual solutions for corporate partners – for instance, through targeted sponsoring of modules in degree programs, laboratories, or entire colleges.

Corinna Harms

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