



Sci-Tech Oscar for Capture System

(ETH Zurich, February 11, 2019)

On 9 February 2019, researchers from ETH Zurich and Disney Research had the honor of receiving a Sci-Tech Oscar in Hollywood for their capture system, Medusa. The Medusa system uses scanners to record facial movements and then renders them into dense animated grids (meshes), breathing new, more realistic looking life into animated figures, for instance. What makes the system so special is that it does not require any anchor points on the face, such as markers or makeup. “[Medusa is] pushing the boundaries of visual fidelity and productivity for character facial performances in motion pictures,” the Academy of Motion Pictures noted. The Sci-Tech Oscar is awarded annually to people and companies whose inventions and innovations have had a significant and lasting impact on film production.



<http://swissinnovation.org/news/web/2019/00-190211-2a>

Ranking: ETH Zurich in Top Ten with 13 Subject Areas

(ETH Zurich, February 27, 2019)

More laurels for ETH Zurich: A recent ranking placed the school among the worldwide top three universities for engineering and technology, and ranks it number seven overall. On a more detailed level, ETH could improve in 15 disciplines compared to last year, dropped by one position in one subject, and held its position in six. The ranking also shows that ETH again ranks first in earth and marine sciences, maintaining its year-long leader position. These results were published by the British company Quacquarelli Symonds. Their World University Rankings, which put an emphasis on the reputation a university enjoys within the expert community, were first published in 2004 and include 1,222 universities.



<http://swissinnovation.org/news/web/2019/00-190227-22>

Neurobiologist Silvia Arber Receives International Prize

(University of Basel, March 25, 2019)

Prof. Silvia Arber, neurobiologist at the Biozentrum, University of Basel, and the Friedrich Miescher Institute for Biomedical research (FMI) and new co-director of the FMI, has been awarded the International Prize 2018 of the Fyssen Foundation. The award honors her scientific achievements in the field of neurobiology. In this field, her research on the assembly, structure and function of motor circuits has resulted in fundamental contributions to our understanding of the organizational principles of the motor system including the spinal cord and the brain-stem. The International Prize, endowed with Euro 60.000, is awarded annually to an internationally recognized scientist. The aim of the Fyssen Foundation is to support all forms of scientific inquiry in the field of cognition, including thought and reasoning, which underlie animal and human behavior, in particular, their biological and cultural bases and phylogenetic and ontogenetic development.



<http://swissinnovation.org/news/web/2019/13-190325-04>

1. Policy

Switzerland and Germany: Strong Partners in Education, Innovation and Research

(SBFI, February 15, 2019)

In February, the annual meeting between the Swiss State Secretariat for Education, Research and Innovation and the German Federal Ministry of Education and Research took place in Bern. The two delegations discussed national strategies, developments on an EU-level as well as the status of the bilateral and multilateral programs and initiatives. For Switzerland, Germany remains by far the most important partner in the fields of education, innovation and research. The countries have ongoing projects in areas such as nano

technology, health science, or information and communication technologies. The issue of prospective threats and opportunities facilitated by international trends like artificial intelligence, digital transformation and the future of vocational training was broached. In the end, the two delegations also reviewed the cooperation of the respective network abroad – the German reference network and the swissnex network.

<http://swissinnovation.org/news/web/2019/02-190215-b8>

Digitization-Focused Investment Promotion

(SBFI, February 20, 2019)

The Swiss Federal Council has recently passed the message "Location Promotion 2020-2023". By means of the location promotion instrument, it aims at contributing to the digital transformation of the economy and further increase Switzerland's attractiveness as well as competitiveness. In order to do so, the Federal Council has requested an amount of 373 \$US from the Swiss parliament. Six main areas are targeted by the location promotion, and the focus lies on digitization in every area. One goal, for example, is the advancement of the e-government, where Switzerland is lagging behind considerably in international comparison. Other core areas include the digitization of the Swiss tourism as well as easing access to the Swiss market for foreign companies, particularly the ones specialized in research and development.

<http://swissinnovation.org/news/web/2019/01-190220-ff>

2. Education

Main Destinations of Swiss Students

(BFS, February 01, 2019)

The Federal Statistical Office examined student's mobility. In 2016, over one fifth of all students graduating from a Swiss higher education institution had studied or done an internship abroad. The main destinations were Germany (13%), followed by the US (10%), France (8%), the UK (8%) and Canada (5%). Considering the type of or institution sheds further light on the matter. Australia was one of the most popular destinations for Master's degree holders from a tier-one university, whereas China was among the main locations for Master's degree holders from universities of applied sciences. Students of the university of teacher education tended to do their exchanges rather in European countries like Spain and Italy. EU student exchange programs account for roughly half of the semesters abroad, while internships were arranged by students themselves in 67% of cases.

<http://swissinnovation.org/news/web/2019/00-190201-cf>

New Master Program Combines University Education with Corporate Internship

(University of Geneva, February 11, 2019)

The digital transformation of organisations and accompanying proliferation of data have turned business analytics into a key area for analyzing and tracking customer behavior and expectations as well as future market trends. The Geneva School of Economics and Management at the University of Geneva offers a Master in Business Analytics to meet this rising demand. The Groupement des Entreprises Multinationales has been the program's exclusive partner since the beginning of the current academic year. The Master, which is unique in Switzerland, combines a first year of academic studies at the university followed by a year on a corporate internship, thereby creating new bridges between higher education and the needs of the business world.

<http://swissinnovation.org/news/web/2019/02-190211-ca>





New CAS Asian Business Law by University of Zurich

(University of Zurich, February 20, 2019)

Asian trading partners have become more and more important in the globalized economy. However, many western companies are still unfamiliar with the specificities of the Asian and especially Chinese markets. Therefore, starting from the autumn semester 2019, the University of Zurich is offering a new CAS in Asian Business Law. The course is taking place in the framework of the LL.M. program International Business Law. This newly offered specialization course, which will be taught in English, is designed to give participants the understanding of the regulatory and legal characteristics of Asia's key markets and thus better assess opportunities and risks. The application deadline for the fall semester is April 30.



<http://swissinnovation.org/news/web/2019/02-190220-ce>

HEC Lausanne Launches New PhD Program in Business Analytics

(University of Lausanne, February 26, 2019)

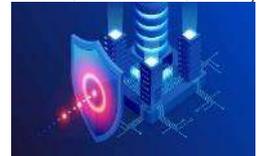
The move to big data means that there is growing demand for people who are well trained in quantitative methods (e.g. statistics, simulation, optimization and mathematics) in the management field in general, and operations management in particular. A new PhD program in Business Analytics has been launched at HEC Lausanne, bringing its total number of PhD programs to seven. This comprehensive program is aimed at individuals working in academic research, consultancy or for major firms. The course is tailor-made for each student, depending on their previous training and area of specialization. They follow a personalized program based on their individual needs, including courses at HEC Lausanne, EPFL and doctoral schools in other Swiss or European universities. The new program already has six students registered for next semester.

<http://swissinnovation.org/news/web/2019/02-190226-6b>

Joint Master's Degree in Cyber Security

(ETH Zurich, March 19, 2019)

With the Internet of Things, our society becomes increasingly connected, causing cyber threats to pose an ever-increasing risk. Data theft, large-scale hacking or attacks on key infrastructure are only some of these risks. To counteract such threats, ETH Zurich and EPFL with the support of the government, have collaborated to offer a new Master's program focusing on cyber security. It will be the first national university-level degree program in Cyber Security – a booming field with excellent job prospects. Most companies and even whole countries will sooner or later have to hire a cyber security manager in order to protect themselves from risks emerging due to increased connectivity. The two technical universities are able to combine their research of the past decade and their strengths in joining forces. The program will begin in the academic year 2019-20.



<http://swissinnovation.org/news/web/2019/02-190319-7a>

3. Life Science

Learning New Vocabulary During Deep Sleep

(University of Bern, February 01, 2019)

Sleeping time is sometimes considered unproductive time. This raises the question whether the time spent asleep could be used more productively, e.g. for learning a new language? To date sleep research focused on the stabilization and strengthening (consolidation) of memories that had been formed during preceding wakefulness. However, learning during sleep has rarely been examined. There is considerable evidence for wake-learned information undergoing a recapitulation by replay in the sleeping brain. The replay during sleep strengthens the still fragile memory traces and embeds the newly acquired information in the preexisting store of knowledge. Now, researchers at University of Bern showed that we can acquire the





vocabulary of a new language during distinct phases of slow-wave sleep and that the sleep-learned vocabulary could be retrieved unconsciously following waking. Memory formation appeared to be mediated by the same brain structures that also mediate wake vocabulary learning.

<http://swissinnovation.org/news/web/2019/03-190201-4a>

Neurobiological Origins of (Un-)Selfish Behavior

(University of Zurich, February 06, 2019)

Researchers at University of Zurich have investigated the neurobiological origins of unselfish behavior. They focused on the right Temporal Parietal Junction (rTPJ); an area of the brain that is believed to play a crucial role in social decision-making processes. The researchers asked the participants of their study to decide whether and how much they wanted to donate to various organizations. They found that people have a moral preference for supporting good causes and not wanting to support harmful/bad causes. However, depending on the strength of the monetary incentive, people will at one point switch to selfish behavior. When the scientists reduced the excitability of the rTPJ using electromagnetic stimulation, the participants' moral behavior remained more stable. The researchers concluded that the rTPJ is not home to altruistic motives per se, but rather to the ability to trade off moral and material values.



<http://swissinnovation.org/news/web/2019/03-190206-45>

Drug Resistance Remains Undetected Due to Inaccurate Tests

(University of Bern, February 08, 2019)

According to the WHO, resistance to drugs used to treat tuberculosis, as well as the proliferation of multi-resistant tuberculosis strains, is one of the most pressing global health problems. The WHO sees an urgent need to improve quality and coverage of diagnosis and treatment of drug-resistant tuberculosis. This was the starting point for a comparative study led by the Institute of Social and Preventive Medicine at the University of Bern. The study compared the results of tests to detect drug resistance in patients done in developing countries with the results of testing at the Swiss tuberculosis reference laboratory in Zurich. For the first time, researchers were able to demonstrate that many cases of drug resistance remain undetected due to inaccurate tests, and that this led to patients being treated incorrectly and, thus, to more deaths.

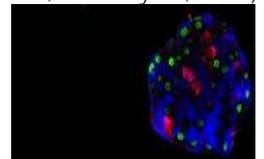


<http://swissinnovation.org/news/web/2019/03-190208-8b>

Adaptive Capacity of Cell Identity

(University of Geneva, February 13, 2019)

Biology textbooks teach us that adult cell types remain fixed in the identity they have acquired upon differentiation. By inducing non-insulin-producing human pancreatic cells to modify their function to produce insulin in a sustainable way, researchers at the University of Geneva show for the first time that the adaptive capacity of our cells is much greater than previously thought. Moreover, this plasticity would not be exclusive to human pancreatic cells.



<http://swissinnovation.org/news/web/2019/03-190213-7b>

Comparison of Drugs Used for Neuroendocrine Tumors

(University of Geneva, February 14, 2019)

Neuroendocrine tumors can develop anywhere in the body from hormone-producing cells. Their prevalence is increasing and therefore also the number of new anti-cancer drugs made available each year is increasing. During the authorization process, such new drugs usually undergo comparisons to one, but only rarely to multiple established drugs. This practice leads to a lack of comparisons between therapies, and makes it increasingly difficult for physicians to choose the best treatment for their patients. To address this, researchers





at the Universities of Basel, Bern and Geneva and at the University Hospitals of Geneva and Bern have conducted an extensive comparison of all drugs used in the treatment of neuroendocrine tumors. Their study aims of guiding physicians through all available treatment options.

<http://swissinnovation.org/news/web/2019/03-190214-f6>

Bat Influenza Viruses Could Infect Humans

(University of Zurich, February 21, 2019)

Known influenza viruses bind to host cells via sialic acids. These chemicals can be found on the surface of almost all human cells and in various animals. This is one of the reasons why influenza viruses can infect species that are very different from one another (e.g. ducks, chickens, pigs, humans). Unlike these viruses, bat influenza viruses do not bind to sialic acids, which is why researchers all over the world started searching for the receptor through which they enter human cells. Researchers at the University of Zurich has now been able to identify this “entry gate”. “The influenza viruses use MHC-II molecules to enter the host cell,” says Silke Stertz. These protein complexes are normally located on the surface of certain immune cells, and their role is to distinguish between the body’s own cells and structures and those that are foreign.



<http://swissinnovation.org/news/web/2019/03-190221-3c>

Blow to Chest Impacts Cardiac Functioning

(EPFL, February 22, 2019)

A blow to the chest can have highly contrasting effects. For instance, some baseball players have died after being hit in the chest by a baseball, while patients undergoing fatal cardiac tachyarrhythmias have been saved by an appropriately timed thump to the chest. Scientists know that such blows create rapid strains on heart tissue, but they still do not fully understand how the blows affect cardiac functioning. Researchers at EPFL and University of Bern have developed an experimental device that lets scientists subject bioengineered heart tissue to highly dynamic strain cycles and measure its electrophysiological response. The researchers found that, contrary to what other studies had concluded, even very rapid strains do not affect the propagation of electrical impulses. “The strain sensitive element in the heart may actually not be the contracting heart cell itself but adjacent connective tissue cells”, says Stephan Rohr from University of Bern.



<http://swissinnovation.org/news/web/2019/03-190222-ae>

Neanderthals Capable of Upright Gait

(University of Zurich, February 25, 2019)

An upright, well-balanced posture is one of the defining features of Homo sapiens. In contrast, the first reconstructions of Neanderthals from the early 20th century depicted them as only walking partially upright. These reconstructions were based on the largely preserved skeleton of an elderly male Neanderthal. However, these prehistoric humans were more similar to us than many assume. Researchers at the University of Zurich have now shown that Neanderthals walked upright just like modern humans – thanks to a virtual reconstruction of the pelvis and spine of a very well-preserved Neanderthal skeleton found in France. The scientists state that the time to recognize basic similarities between Neanderthals and modern humans has come and it is necessary to switch the focus to biological and behavioral changes that occurred.



<http://swissinnovation.org/news/web/2019/03-190225-9d>



CRISPR Reveals Secret Life of Antimicrobial Peptides

(EPFL, February 26, 2019)

In our immune system, lymphocytes like B and T cells or macrophages go on constant seek-and-destroy missions against invading pathogens like bacteria and viruses. Yet we also have a lesser-known first line of defense called “innate immunity”. Among its weapons is a family of small peptides, known as antimicrobial peptides (AMPs). AMPs are produced by human cells and combat invading microorganisms by breaking apart their cell membranes or by disrupting their functions. Scientists at EPFL’s Global Health Institute have used CRISPR, the gene-editing technique, to delete 14 AMPs from the fruit fly *Drosophila* and observe how their absence affected the fly’s resistance to different bacteria and fungi. These results show how human AMPs might help fight or prevent infection, and indicate ways of managing economically important insects.



<http://swissinnovation.org/news/web/2019/03-190226-af>

Non-Invasive Method to Explore Depth of Human Brain

(University of Geneva, February 27, 2019)

The subcortical areas of the brain remain a mystery. Scientists are aware of the critical role they play in motor, emotional and associative activity but do not know precisely how they work. A number of serious diseases are directly linked to these areas, including Parkinson’s, Tourette syndrome and obsessive-compulsive disorders. It is very difficult to study and get close to the subcortical areas and current treatments to measure their activity are highly invasive. Researchers at the University of Geneva have now successfully demonstrated that electroencephalography can be used to study activity in the deep areas of the brain. The electroencephalogram records the electrical activity of the brain in a non-invasive way using 256 electrodes placed on the scalp. This finding has opened the door to new precision treatments.



<http://swissinnovation.org/news/web/2019/03-190227-13>

Center for Precision Medicine

(University of Bern, February 27, 2019)

Precision medicine “tailored” to individual patients is regarded as the medicine of the future. It ensures that the right therapy gets to the right patient by incorporating individual characteristics, such as genetic predisposition or lifestyle, in the treatment. To that end, it enables the development of new therapies in which, for example, the body’s own immune system is mobilized in the fight against cancer. The University of Bern and the Inselspital have recently taken measures to promote Precision Medicine even further by opening the Bern Center for Precision Medicine. The scientific knowledge from the clinics and research groups can consequently flow directly into teaching and allow Bern to take a leading role in training doctors in this field.



<http://swissinnovation.org/news/web/2019/03-190227-a7>

Stress as Remedy to Inflammatory Bowel Disease

(University of Bern, February 28, 2019)

An international research group with the involvement of the University of Bern and the University Hospital of Bern, has detected a so far unknown protection mechanism of the intestine. Nutritional components, bacteria or viruses as well as genetic factors can influence the intestinal well-being and cause defense mechanisms that may manifest themselves as inflammatory bowel diseases (IBD). Around 20'000 people in Switzerland suffer from IBDs. One part inside the intestinal cells which reacts very sensitively to environmental stressors is the so-called endoplasmic reticulum (ER). The research now shows that ER-stress potentially has positive effects on bowel inflammation. The stress releases defense cells from the abdominal cavity, which can enhance the protective barrier of the intestinal mucosa and thus provide protection against inflammatory responses. The newly detected mechanism has the potential to improve future therapy of IBDs.



<http://swissinnovation.org/news/web/2019/03-190228-c7>

Brain May Cause Broken Heart Syndrome

(European Heart Journal, March 05, 2019)

Researchers of the University of Zurich and the University Hospital of Zurich have recently published a paper on the Takotsubo syndrome (TTS), more commonly known as "Broken Heart" syndrome. This refers to a dysfunction of the heart, often triggered by emotional or physical stress, which sometimes leads to death. For the first time, it could be shown that the brain might play a role in triggering TTS. A lack of communication between central brain regions, which some patients showed after having experienced emotional distress, can be associated with the development of TTS. These findings contribute to the understanding of the syndrome and allow for further research on the topic to be conducted.

<http://swissinnovation.org/news/web/2019/03-190305-a0>

Blood Cell Production Boost for Cancer Treatment

(EPFL, March 07, 2019)

Researchers of the University of Lausanne and the EPFL have made a discovery that could potentially help overcome problems in stem cell-based therapies, such as treatments in leukemia or aggressive lymphoma. By supplementing a diet with nicotinamide riboside, an analogue of vitamin B3, the production of blood cells was boosted by improving the functions of their stem cells. Stem cell-based therapies are becoming ever-more common in the treatment for blood cancers. In these therapies, the patient's cancerous blood stem cells are removed and replaced with new, healthy ones. However, as replenishing of blood cells is slow, up to a quarter of all cases still end in death. The findings have significant implications for such therapies: Nicotinamide riboside can be taken as a dietary supplement to accelerate blood recovery of cancer patients, even after a chemo- or radio-therapy.



<http://swissinnovation.org/news/web/2019/03-190307-86>

Ultra-Fast Test for Multi-Resistant Tuberculosis

(University of Zurich, March 11, 2019)

Each year, 10.4 million people worldwide are infected with tuberculosis, a highly infectious bacterial disease. Anyone who gets infected with extremely resistant pathogens can no longer be treated with common antibiotics and over 10% of the infected population die from it, translating into 1.4 million deaths per year. Even though the WHO aims at reducing the death rate by 95%, cases of multi-resistant tuberculosis are increasing globally. Biologists at University of Zurich have now developed a comprehensive rapid diagnostic test for multi-resistant tuberculosis pathogens. The test is able to determine whether a bacterial tuberculosis infection has occurred, and which antibiotics could be effective against the pathogen within 24 hours. They now want to advance the test into a commercial product and sell it as a diagnostics kit. However, more clinical trials need to be carried out first.

<http://swissinnovation.org/news/web/2019/03-190311-cb>

Vaccine Developed to Block Osteoarthritic Pain

(University of Bern, March 12, 2019)

Osteoarthritis (OA) is the most widespread joint disease in humans and poses a social problem because insufficient pain control medication is available. Estimates assume that OA costs between 1-2,5% of developed countries' GDP due to the debilitating effects. Researchers of the Universities of Bern and Oxford have developed a vaccine able to block the main cause of pain in OA. They tested the virus-like particle vaccine in mice with signs of OA-pain, indicated by an uneven distribution of weight across the hind legs. The vaccine enhances the production of antibodies that block the naturally-occurring nerve growth factor (NGF) – the cause of the pain. According to the researchers, the development of effective pain medication with fewer side-effects was urgently needed and the results are highly promising. Before the vaccine can be tested on patients, it needs to undergo comprehensive clinical trials.



<http://swissinnovation.org/news/web/2019/03-190312-1f>



Stress Hormones Accelerate Breast Cancer Metastasis

(University of Basel, March 13, 2019)

It has long been believed that stress promotes the progression of cancer. For the first time, the molecular mechanisms linking breast cancer metastasis and stress hormones were deciphered. Scientists of the University of Basel found that synthetic derivatives of stress hormones, often used against inflammation during chemotherapies, have weakening effects on the therapy's efficiency. The researchers profiled the activity of genes in a mouse model of breast cancer and found that metastases have increased activity of glucocorticoid receptors (GR) which smooth the effects of stress hormones such as cortisol. Additionally, the concentration of stress hormones were higher in mice with metastases than in mice without. Increased levels of stress activate the GR, which cause increased heterogeneity of the cancer cells – and shortened survival. These findings suggest that caution should be taken when prescribing GR to patients with breast cancer.

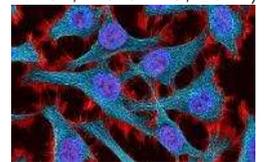


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Cell Division Hinders Reproducibility

(ETH Zurich, March 13, 2019)

HeLa cells are used in tens of thousands of scientific publications. However, these cloned descendants of human cancer cells cannot always be reproduced by other scientists. The problem is that HeLa cells are essentially cancer cell, which change over time, even though they have the same origin. Every 24 hours, the cells divide and each division might showcase random mutations that change the genome. Conducting an identical experiment with them in various locations can lead to different results. Often, this is interpreted as poor work or non-reproducibility. An ETH professor has newly initiated a massive project called molecular cell measurement. The aim of it is to publish recommendations on how to deal with the reproducibility of scientific findings. For example, scientists should always ensure that the used cells are thoroughly documented and that they have undergone as few divisions as possible

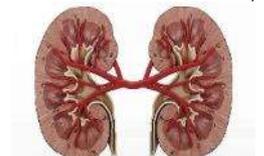


<http://swissinnovation.org/news/web/2019/04-190313-0e>

Kidney Research on the Rise

(University of Zurich, March 14, 2019)

Kidney experts from the Universities of Zurich, Basel, Bern, Geneva and Lausanne as well as hospitals, founded the Kidney.CH conglomerate. This is a research center to enhance the understanding of kidneys. Some areas of interest revolve around the regulation of oxygen by the hormone EPO, the mechanisms by which the correct balance of minerals, bases and acids is sustained in the kidneys or questions on how and why kidney stones are formed. This last area has constituted a focal point for 6 years. So far, it is known that 60% of people who develop kidney stones have a genetic predisposition to it. The conglomerate now analyzes to what extent a kidney-friendly diet and lifestyle can countervail this predisposition. Additionally, they try to find out why twice as many men than women are affected by kidney stones.



<http://swissinnovation.org/news/web/2019/03-190314-0f>

Helping Children with Severe Heart Defects

(University of Zurich, March 15, 2019)

In Switzerland, severe heart diseases are quite rare with only 100 out of 80'000 a year being affected. For children, severe heart diseases often manifest themselves through developmental delays, which is especially problematic for their educational performance, albeit it has nothing to do with their IQ. Some consequences are for example poorer memories, slower ability to learn or a lack of concentration. A developmental pediatrician from the University of Zurich has now started a support program to help these children through adolescence. The methodology of the support program will be play-based and include games to promote such executive





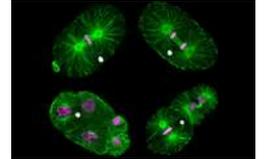
skills. Another aim of the program is to collect data on stress behavior and resilience in order to compare the stress systems of children with and children without heart defects. Follow-up projects will ensue this.

<http://swissinnovation.org/news/web/2019/03-190315-d7>

Female Roundworms Clone Themselves

(University of Bern, March 15, 2019)

The so-called *Mesorhabditis belari* roundworm displays a unique form of reproduction. An international research team with the participation of the University of Bern, recently discovered that the females are able to produce clones of themselves. The sole purpose of the males, meanwhile, is to help the females producing a this clone. Males are rare specimens in this roundworm and genetic material found in sperm is seldom used by eggs. This results in embryos that are a clone of the mother and only 9% of the embryos are male. The researchers examined how this ratio was achieved and by applying game theory, they could induce that this is a stable evolutionary strategy. The quantity allows for a maximum number of females, without wasting too many resources on males with no future. In a next step the emergence of this reproduction-type will be explored.



<http://swissinnovation.org/news/web/2019/04-190315-52>

In-Vitro Simulation of Protein Digestion

(The Federal Council, March 19, 2019)

Proteins, peptides and free amino acids are the three stages of protein digestion. After food has been chewed and swallowed, these digestive steps take place mainly in the stomach and small intestine. An international team of scientists has successfully developed a harmonized method for the in-vitro digestion of proteins. At the helm of the 15-nation research team are among others Switzerland, represented by Agroscope. They were able to reproduce the stages in vitro with a physiological method, meaning natural conditions in the digestive tract are imitated. This system allows to draw very precise physiological conclusions and can be applied to simulate digestive processes, and evaluating them qualitatively and quantitatively. This can reveal the value or benefit of the protein for humans. Long-term, the work aims at improving nutritional recommendations and determine the ecological footprint of foods based on their value.

<http://swissinnovation.org/news/web/2019/04-190319-c8>

Fatigue Identification with Smartwatches

(EPFL, March 26, 2019)

Stress and fatigue can cause major health consequences; however, individual fatigue levels are rarely measured. Scientists of EPFL and University of Lausanne have developed a system that uses heart rate variability – the number of milliseconds between two heart beats – to detect and identify what kind of fatigue it is. By distinguishing what type it is, patients can be provided with targeted recommendations. With smartwatches and chest-strap heart-rate monitor and the aid of Lausanne-based firm be.care, data of students was collected and classified. The recommendations given to patients depend on the results of the algorithms' analysis and include suggestions for both diet and exercise. The application is still being developed and in the second phase the researchers want to determine whether there is a positive or negative correlation between physical activity and fatigue.



<http://swissinnovation.org/news/web/2019/05-190326-b4>



Establishing a Taxonomy for Neurons

For almost one century, scientists have tried to name and classify cells, but they retained the same method Darwin used to describe flora and fauna. However, researchers at EPFL have come a step closer to a standardized taxonomy for neurons in the brain thanks to the Blue Brain Project. In relation to this project, the researchers have developed an algorithm to distinguish the different shapes of the most common type of neuron in the neocortex, so-called pyramidal cells. Pyramidal cells are distinctively tree-like cells that make up 80% of the neurons in the neocortex. This breakthrough can benefit the entire neuroscience community, as it will provide a more sophisticated understanding of cell taxonomy, and a reliable comparative method.

(EPFL, March 27, 2019)



<http://swissinnovation.org/news/web/2019/03-190327-58>

30 Genes Under Suspicion to Cause Schizophrenia

Schizophrenia is a psychosis that leads to a disturbed perception of reality, including hearing voices, hallucinations or delusions. It is still incurable, albeit medical treatment exists nowadays. A research team from the University of Basel has recently investigated 132 genes associated with schizophrenia and found a potential connection to the disease in 30 genes. For zebrafish, the researchers found that errors in these genes impair the development of the brain and cause behavioral abnormalities. The research team not only deciphered the function of the individual genes, but also generated an atlas of all genes with their respective consequences for the brain. The question of how a single gene triggers schizophrenia remains open but further investigation into whether human patients experience similar changes in the brain as zebrafish will take place. This would then allow for new drug therapies.

(University of Basel, March 28, 2019)



<http://swissinnovation.org/news/web/2019/03-190328-30>

4. Nano / Micro Technology / Material Science

Novel Method to Track Nanoplastics in the Environment

More than 98% of the smallest plastic particles from sewers are retained in sludge. Researchers have been able to prove this by incorporating the precious metal palladium as a tracer in artificial nanoplastics. This innovative method has great potential for keeping track of the behaviour of nanoplastics in technical systems as well as in environmental situations. The researchers used their new method to study how nanoplastic particles behave once they land in sewage after usage. Until now it has not really been possible to measure them there. The researchers found that the particles bind very quickly to the sludge flocculate, resulting in an ultimate elimination level of over 98%. This is a positive result, as it indicates that if the sludge is burned, as is the practice in Switzerland, very little nanoplastic material makes it into the environment.

(Eawag, February 04, 2019)

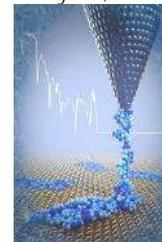


<http://swissinnovation.org/news/web/2019/04-190204-67>

Cryo-Force Spectroscopy

(University of Basel, February 08, 2019)

DNA can be used to produce tiny components for technical applications. In a process known as DNA origami, scientists can manipulate the genetic material in such a way that folding the DNA strands creates tiny two- and three-dimensional structures. To be able to form the desired shapes, it is important to be familiar with the structure, the elasticity and the binding forces of the DNA components being used. These physical parameters cannot be measured at room temperature, because the molecules are constantly in motion. So, now physicists from the University of Basel have developed a new method to examine the elasticity and binding properties of DNA molecules on a surface at extremely low temperatures. With a combination of cryo-force spectroscopy and computer simulations, they were able to show that DNA molecules behave like a chain of small coil springs.



<http://swissinnovation.org/news/web/2019/04-190208-d5>

Soft Micro Robots to Stimulate Cells

(EPFL, February 08, 2019)

Human tissues experience a variety of mechanical stimuli that can affect their ability to carry out their physiological functions, such as protecting organs from injury. The controlled application of such stimuli to living tissues in vivo and in vitro has now proven instrumental to studying the conditions that lead to disease. At EPFL a research team has developed micromachines able to mechanically stimulate cells and microtissue. These tools, which are powered by cell-sized artificial muscles, can carry out complicated manipulation tasks under physiological conditions on a microscopic scale. The tools consist of microactuators and soft robotic devices that are wirelessly activated by laser beams. They can also incorporate microfluidic chips, which means they can be used to perform combinatorial tests that involve high-throughput chemical and mechanical stimulation of a variety of biological samples.



<http://swissinnovation.org/news/web/2019/04-190208-a0>

New Non-Toxic Fire Protection for Wood

(Empa, February 14, 2019)

Scientists in Switzerland have developed a new flame retardant for wood and wood-based materials. It is colorless and can be mixed with water-based paints or UV protective coatings and can be used not only as a coating but also as an additive in wood-based panels. In addition, it is free of bromine and boron and contains no halogenated organic compounds. It produces no toxic vapors and develops its flame-retardant effect at concentrations as low as ten percent. It combines phosphorus and nitrogen moieties in a single molecule, which has flame-retardant effects on cellulose. This research makes it possible to again use wood and similar materials in buildings and vehicles, while still meeting fire protection regulations and requirements.



<http://swissinnovation.org/news/web/2019/04-190214-08>

Reproducible Growth of Nanowire Networks

(EPFL, February 20, 2019)

Nanowires have the potential to revolutionize the technology around us. Measuring just 5-100 nanometers in diameter (a nanometer is a millionth of a millimeter), these tiny, needle-shaped crystalline structures can alter how electricity or light passes through them. They can emit, concentrate and absorb light and could therefore be used to add optical functionalities to electronic chips. Up until now, it was impossible to reproduce the process of growing nanowires on silicon semiconductors – there was no way to repeatedly produce homogeneous nanowires in specific positions. But researchers from EPFL, from MIT and the IOFFE Institute, have come up with a way of growing nanowire networks in a highly controlled and fully reproducible manner.



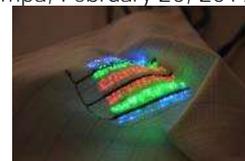
The key was to understand what happens at the onset of nanowire growth, which goes against currently accepted theories.

<http://swissinnovation.org/news/web/2019/04-190220-cc>

Smart Textiles to Prevent Skin and Tissue Injuries

(Empa, February 20, 2019)

The research team around the "ProTex" project is developing textile, "smart" sensors that prevent the occurrence of pressure injuries. Pressure injuries or ulcers of the skin and underlying tissue occur when the oxygen supply to the skin and underlying tissue is disturbed by pressure in persons with paraplegia who cannot move well and bedridden patients. The treatment is complex and expensive. This makes pressure injuries a serious health problem. It is therefore all the more important not to let them arise in the first place. The ProTex sensors can be integrated into clothing such as underwear or stockings and continuously measure the pressure and oxygen saturation of the skin and underlying tissue. When the oxygen content drops and the sensors detect the risk of bedsores, they trigger an alarm signal. The person can be moved and repositioned.

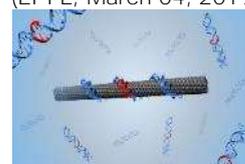


<http://swissinnovation.org/news/web/2019/04-190220-f2>

Building Nanoparticles Using Directed Evolution

(EPFL, March 04, 2019)

Directed evolution is a powerful technique for engineering proteins. EPFL scientists have now shown that it can also be used to engineer synthetic nanoparticles as optical biosensors. These tiny devices are widely used in biology, drug development, and even medical diagnostics such as real-time monitoring of glucose and insulin. The great advantage of directed evolution is that a protein can be engineered without even knowing how its structure is related to its function. The study carried out at EPFL shows that as materials scientists and physicists, one can still learn a few pragmatic lessons from biologists.



<http://swissinnovation.org/news/web/2019/08-190304-7c>

Nanotechnology and Sunlight Prevent Fogging

(ETH Zurich, March 05, 2019)

Anyone who wears glasses, uses a camera or drives a car knows the problem: Once you enter a humid environment from the cold, your eyewear, lens or windshield can fog up. Researchers at the ETH Zurich have now developed a new coating, which greatly reduces this occurrence. It is extremely thin and made of gold nanoparticles embedded in non-conductive titanium oxide. The coating absorbs the infrared component of sunlight along with a small part of the visible sunlight and converts this into heat. The heat increases the surface by 3-4°C, and thereby prevents the fogging. This method works more passively than the technique applied in cars, where electrical heating elements are fitted to the window. With the sun being the only energy source required, the new coating is especially suitable for wearable items such as glasses and goggles.



<http://swissinnovation.org/news/web/2019/08-190305-95>

Simulation of Adhesive Wear

(EPFL, March 08, 2019)

Surface wear describes the process of material loss when two surfaces come into contact with each other. It has significant economic, social and health consequences. There are several wear mechanisms, yet the adhesive type is most common. It happens when two surfaces rub against one another and adhere. EPFL researchers managed to observe how surface roughness changes when two materials rub together by using high-performance computer simulations. They simulated these mechanisms over an extended period of time



and captured the entire process, from the initial geometry to the final fractal geometry. The findings provide insight into friction and wear mechanisms and have implications on areas such as engineering or tectonic faults. The researchers hope to explore the origins of adhesive wear by applying their simulation approach to materials that are of interest to industry.

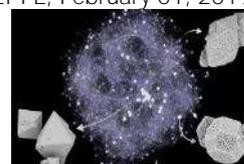
<http://swissinnovation.org/news/web/2019/04-190308-d6>

5. Information & Communications Technology

Quantifying Researchers' Intuition Through Machine Learning

(EPFL, February 01, 2019)

Whether they realize it or not, chemical researchers who carry out several experiments, successful and otherwise, get a feel for what will work and what will not. This “gut feeling” tells them which variables could have the greatest influence on the outcome of a chemical reaction. For example, if a scientist finds that changing the reaction temperature alters the results of his experiment, even slightly, then he will be more likely to focus on the temperature variable. A newly developed machine learning method developed at EPFL now enables chemists to not only quantify researchers' intuition, but also program the research group's robot to carry out synthesis reactions more efficiently. “Now we need to convince scientists to open up and talk about their unsuccessful experiments. If we're able to do that, we can dramatically change the way chemical research is performed,” says Berend Smit.



<http://swissinnovation.org/news/web/2019/05-190201-49>

With Calcium Ions Against Errors in Quantum Computer

(ETH Zurich, February 27, 2019)

Researchers at ETH Zurich have used trapped calcium ions to demonstrate a new method for making quantum computers immune to errors. To do so, they created a periodic oscillatory state of an ion that circumvents the usual limits to measurement accuracy. A few experimental obstacles still have to be overcome, for instance, the calcium ion first needs to be coupled to another ion by electric forces, so that the oscillatory state can be read out without destroying it. But even in its present form the method of the ETH researchers is of great interest for applications. The results have been published in the scientific journal Nature.



<http://swissinnovation.org/news/web/2019/05-190227-1d>

Data Transfer by Controlled Noise

(ETH Zurich, March 01, 2019)

Scientists have developed sophisticated techniques over the past decades in order to send as much information as possible from A to B at the same time. Those techniques, generally known as multiplexing, allow one to transmit more signals than the number of available transmission channels. A typical example for this is radio broadcasting on different frequencies. Scientists at ETH have now invented a novel multiplexing technique that is based on noise. They hope that their method will be able to increase the data capacity of fiber optic cables even more. As their method does not require coherent laser light, it should also be cheaper than conventional technologies. Further, they hope that correlation coding could also contribute to data safety.



<http://swissinnovation.org/news/web/2019/05-190301-14>

Europe Builds a Time Machine Using AI

(EPFL, March 01, 2019)

The initiative Time Machine is one of six projects chosen by the European Commission to be developed in the next decade. Time Machine refers to an artificial intelligence (AI) initiative which aims at mining Europe's vast cultural heritage, providing fair and free access to information that will support future scientific and technological developments. In a nutshell, it is a large-scale computing and digitization infrastructure which will map Europe's entire social, cultural and geographical evolution. The initiative is supposed to become one of the most advanced AI-systems ever built, trained on data from wider geographical and temporal horizons than other systems. The researchers believe that this will provide Europe with a competitive advantage in the global AI race.



<http://swissinnovation.org/news/web/2019/05-190301-ed>

Combining Technologies Poses Danger to E-Voting

(ETH Zurich, March 03, 2019)

Nowadays, not only data but also digital interactions are a tradable commodity. Businesses pay users to carry out online tasks, like writing paid reviews. This is referred to as "crowdturfing". The reviews appear genuine, and identifying fake ones is difficult for operators. But there are disadvantages: the purchased users must be instructed and paid, which exposes the relationship between the seller and buyer. To deal with this problem, doctoral students at ETH Zurich have combined the Trusted Execution Environment (TEE) technology with cryptocurrencies to guarantee complete bilateral anonymity. However, this also poses great risks: the system makes certain actions available for lease, among them votes on e-voting platforms. Although a third party carries out the action, it technically takes place on the seller's computer. The doctoral student highlight that this makes the system susceptible for abuse as votes could be bought. They highlight that for any new technology risks and opportunities must be considered.



<http://swissinnovation.org/news/web/2019/05-190303-3a>

Focus Digitalization in Zurich

(University of Zurich, March 08, 2019)

The higher institutions of the Canton of Zurich have started DIZH, an initiative to boost digitization. It is set to receive 108 US\$ million in special cantonal funding for the years 2020 to 2029. The University of Zurich will contribute 99 US\$ million of its own resources to the total fund of 300 US\$ million. Thanks to collaboration with the Zurich University of Applied Sciences (ZHAW), the Zurich University of the Arts (ZHdK) and the Zurich University of Teacher Education (PHZH) the Canton Zurich as a center for higher education will be reinforced. The initiative will not only allow the University of Zurich to strengthen its cooperation with the other universities, but also enables it to create three new joint professorships together with the Digital Society Initiative (DSI), develop a doctoral program, and expand infrastructure and laboratory space.



<http://swissinnovation.org/news/web/2019/00-190308-23>

Medical Data Collection Using Blockchain

(EPFL, March 12, 2019)

Nowadays, vast amounts of medical research and enhanced machine learning techniques would allow limitless possibilities for precision medicine, yet securely analyzing medical data remains a sensitive topic. To deal with this deficiency, EPFL has developed the first operational system to collect sensitive patient data for medical research without compromising patient privacy. The software, called MedCo, is authorized to explore data from various sources, such as hospitals based on clinical and genetic criteria



without compromising patient privacy. Advanced cryptography – homomorphic encryption and private blockchain – achieves complete patient confidentiality and makes it possible to store and access data from different countries. MedCo has been released as open-source code and the research team is seeking cooperation to turn the prototype into a system for hospitals, pharmaceutical companies and researchers to use. The system will hopefully allow to develop better diagnosis and therapies in the future.

<http://swissinnovation.org/news/web/2019/05-190312-79>

6. Energy / Environment

Solar Energy for a Circular Economy

Today, fuels and products from the chemical industry are mainly produced on the basis of fossil resources. This is set to change in the future: solar energy and atmospheric gases such as carbon dioxide, water and nitrogen are to provide a sustainable alternative. The goal is a carbon cycle that initially reduces the carbon dioxide content in the atmosphere and stabilizes it in the long term. At the same time, land and natural resources must be used sustainably within a circular economy. In order to realize this vision, 20 European partners from universities, research laboratories and industry founded the project SUNRISE – Solar Energy for a Circular Economy. From Switzerland, Empa is taking part in the project.

<http://swissinnovation.org/news/web/2019/06-190201-79>

(Empa, February 01, 2019)



Graphene's Effects on People and Environment

Graphene, a single layer of hexagonally arranged carbon atoms, is regarded as the miracle material of the future: flexible, transparent and strong, it has different electrical properties plus the highest thermal conductivity of all known materials. It therefore has countless applications. But are products containing graphene also safe for humans and the environment? A comprehensive review, undertaken as part of the large-scale European research program "Graphene Flagship" that involves 15 European universities and research institutes, has been investigating this question for five years. Empa researchers have, for example, studied how graphene oxide affects the human lung, gastrointestinal tract or placental barrier. Study results vary, however, since graphene's structure appears to affect activity. Work is now underway to create a detailed model to predict how graphene structure affects living systems.

<http://swissinnovation.org/news/web/2019/06-190207-2c>

(Empa, February 07, 2019)



Restoring Rivers to a Natural State

Today, very few Swiss rivers or streams still flow in a natural bed. Since the eighteenth century, around 15,000 kilometres of watercourses have been modified, engineered or channelised. The degradation of aquatic habitats has had a severe impact on biodiversity. To tackle this problem, the federal government has requested the cantons to restore around 4,000 kilometres of rivers and streams by 2090. A group of scientists in Eawag's Systems Analysis, Integrated Assessment and Modelling (SIAM) department have developed a new assessment procedure to evaluate the outcomes of different restoration strategies. This procedure makes it possible to determine where restoration would be particularly worthwhile for the ecosystem as a whole.

<http://swissinnovation.org/news/web/2019/06-190208-f8>

(Eawag, February 08, 2019)





Global Ice Volume Recalculated

(ETH Zurich, February 11, 2019)

Led by ETH Zurich and the Swiss Federal Institute for Forest, Snow and Landscape Research WSL, an international team of glaciologists used a combination of different numerical models to calculate the ice thickness distribution and the ice volume of some 215,000 glaciers around the world. The researchers excluded sea ice and glaciers that are connected to the Greenland and Antarctic ice sheets from their calculations. According to the study, the combined ice volume of all considered glaciers currently amounts to some 158,000 cubic kilometres. The last available estimate, dating a few years ago, was around 18% higher. For their analysis, the researchers used a combination of up to five independent numerical models. In these models, several sources of information, including the glacier outlines derived from satellite images and digital elevation models of the glacier surface, were combined with data about the glaciers' flow behaviour.



<http://swissinnovation.org/news/web/2019/06-190211-2f>

Scientific Expedition GLACE to Circumnavigate Greenland

(Swiss Federal Institute for Forest, Snow and Landscape Research, February 11, 2019)

Changes in the Arctic Ocean influence global circulation patterns both in the ocean and in the atmosphere. The increased rate of Arctic sea ice loss in recent decades and predictions of an ice-free Arctic ocean due to global warming will affect the world's climate, with far-reaching economic and social impacts. The Greenland Circumnavigation Expedition GLACE is a unique opportunity to study the Arctic environment around Greenland, accessing remote and understudied areas on land and at sea. This scientific expedition is organized by the Swiss Polar Institute SPI and supported by the Swiss Polar Foundation. Its scientific program includes 15 projects, led by international experts and involving 44 scientists from many countries to improve understanding of processes related to global warming. Follow the expedition on www.GLACEexpedition.ch and on social media.



<http://swissinnovation.org/news/web/2019/06-190211-bc>

New Device Simplifies Measurement of Fluoride Contamination in Water

(EPFL, February 12, 2019)

Adding fluoride to water has been common practice in a number of countries. In low concentrations (below 1.5mg/L) can help prevent tooth decay and even strengthen bones, but going above can have the opposite effect, causing serious dental and bone disease. Therefore, the WHO has set 1.5 mg/L as the maximum limit for fluoride in drinking water. But measuring fluoride at such low concentrations with sufficient accuracy is expensive and requires a well-equipped chemical lab. Because of this, fluoride contamination in water affects a number of developing countries and parts of developed countries. A team of scientists at EPFL has now built a device that can accurately measure fluoride concentrations using only a few drops of water resulting in a simple change in color brightness. The device is named SION-105, is portable, considerably cheaper than current methods, and can be used on-site by anyone.



<http://swissinnovation.org/news/web/2019/04-190212-b6>

Our Blue Planet

(University of Bern, February 12, 2019)

Earth's solid surface and clement climate may be in part due to a massive star in the birth environment of the Sun. Without its radioactive elements injected into the early solar system, our home planet could be a hostile ocean world covered in global ice sheets. This is demonstrated by computer simulations in which the National Centre of Competence in Research PlanetS, based at the University of Bern, was involved. Researchers are eagerly awaiting the launch of upcoming space missions, with which Earth-sized exoplanets outside our solar



system will be observable. These will bring humanity ever-closer to understanding whether our planet is one of a kind, or if there are an infinity of worlds of the same kind as ours.

<http://swissinnovation.org/news/web/2019/06-190212-f8>

Fate of Meerkats Tied to Seasonal Climate Effects

(University of Zurich, February 14, 2019)

Using detailed monthly life-history data collected by the Kalahari Meerkat Project between 1997-2016, scientists at the Universities of Zurich and Cambridge have assessed how meerkats (*Suricata suricatta*) will fare in response to future changes in seasonal rainfall and temperature. Their data shows that the combined effects of hotter and drier summers in particular may threaten the persistence of the meerkat population.



In the projections, fewer offspring were produced, resulting in fewer helpers in the population. In this scenario, the meerkat population plummeted, increasing the risk of population collapse. In contrast, the negative effects of less rainfall in summer would be alleviated to an extent if winters became warmer, allowing meerkats to gain weight and step up reproduction. Taking these counteracting seasonal changes into account leads to a different scenario, in which the probability of extinction is less severe and the meerkats would still persist in 50 years.

<http://swissinnovation.org/news/web/2019/06-190214-1b>

Environmental Impact on Evolution of Biodiversity

(Swiss Federal Institute for Forest, Snow and Landscape Research, February 14, 2019)

The further apart two locations are and the more temperature or humidity vary, the more do the inhabitant species differ from each other. Researchers at the Swiss Federal Institute for Forest, Snow and Landscape Research (WSL), and the Universities of Lausanne and Grenoble have now found to what extent the environment itself – independent of distances between locations- influences the evolution of species composition in a certain area. With their method, which can trace past evolutionary processes using biodiversity data, the scientists showed for example that in Europe only a few species of cold-blooded vertebrates like amphibians and reptiles have been able to adapt to cold and humid regions through evolution. Thus, they are all closely related – in contrast to the warm-blooded species groups (birds and mammals), which could adapt to the cold earlier in the evolution.



<http://swissinnovation.org/news/web/2019/06-190214-3c>

Stability of Pesticides in Honey

(University of Neuchâtel, February 19, 2019)

Researchers at the University of Neuchâtel have developed a method to quantify tiny concentrations of neonicotinoids in honey. With their colleagues from the Botanical Garden of Neuchâtel, who have participated in this work, they are worried about the long stability of these molecules, some of which persist for at least 40 months in honey. The long stability of these molecules raises the concern of Neuchâtel researchers. "If these substances are reported to the hive with the nectar, it means that the entire colony (including the queen) is exposed for a lifetime to neurotoxic," warns Blaise Mulhauser, director of the Botanical Garden of Neuchâtel. "Similarly, honey for human consumption will maintain an identical concentration of pesticides for many months," says Edward Mitchell from University of Neuchâtel.



<http://swissinnovation.org/news/web/2019/06-190219-06>

Fly Larvae for Climate Friendlier Biowaste Disposal

(Eawag, February 19, 2019)

As the world's population grows, piles of biowaste also grow due to lack of money for proper waste disposal. Large quantities of greenhouse gases, especially methane, are emitted from rubbish dumps, as well as from typical composting facilities. Researchers at Eawag, supported by the Swiss State Secretariat for Economic Affairs (SECO), are investigating options for treating this kind of waste in the most efficient ways possible.



They are breeding black soldier flies, whose larvae feed on biowaste and break it down. When biowaste is decomposed with the help of soldier-fly larvae, this cuts greenhouse gas emissions by around half compared to conventional composting. Using this method could alleviate the waste problem in many countries and, as a bonus, the protein-rich larvae can then be used as animal feed.

<http://swissinnovation.org/news/web/2019/06-190219-02>

Horizontal Gene Transfer Among Grasses

(University of Bern, February 19, 2019)

In Darwin's theory of evolution, those individuals survive that can best adapt to the circumstances. These adaptations are achieved through genetic mutation and thus occur vertically, that is from generation to generation. But there is another, a horizontal path. In a new study, an international team including researchers from the University of Bern, has sequenced the genome of a wild grass and found that its genetic material contains nearly 60 genes that the plant has acquired via so-called horizontal gene transfer. With genetic engineering, scientists are deliberately changing the DNA of plants. Future research will help better understand the uncontrolled transmission of genetically modified genetic material.



<http://swissinnovation.org/news/web/2019/06-190219-27>

Floating Research Station on Lake Geneva

(Eawag, February 20, 2019)

As of this week, "LéXPLORE", a 100 metre research platform, is afloat on Lake Geneva. On board are countless radiosondes and sensors monitoring daily temperatures and winds, current speeds in the water as well as light, turbulence, oxygen, carbon dioxide, various algae groups and a wide range of natural and artificial substances. The collected data should enable researchers at Eawag, EPFL and the Universities of Lausanne and Geneva to gain a better understanding of the ecological processes at work in Lake Geneva as well as the interactions between the water and the atmosphere. The platform is intended to be accessible to all interested aquatic researchers. In addition, all members of the public will have real-time access to the online data.



<http://swissinnovation.org/news/web/2019/06-190220-c1>

Glaciers are Melting Away

(University of Lausanne, February 21, 2019)

An article published in the New York Times, entitled: "A Threat, but also an opportunity", concludes that although glaciers are melting, Switzerland sees a potential for hydroelectric development. In fact, glaciers are Switzerland's insurance policy. They allow the country to have increased melting when there is less snow during the winter. It is this insurance policy that will end when the glaciers melt. The construction of new dams might be an alternative because it increases the amount of electricity produced per melted unit. The problem, however, is that the maintenance of current systems becomes so expensive that the production is economically not favorable. At the moment, no one knows how new projects could be financed.



<http://swissinnovation.org/news/web/2019/06-190221-c8>

Solid State Batteries for the Future of Electric Cars

(Empa, February 22, 2019)

As part of a strategic international cooperation program of the Fraunhofer-Gesellschaft, Empa in Dübendorf (CH) and the Fraunhofer Institute for Silicate Research ISC in Würzburg (D) launched a three-year joint research project to create the basis for a production-ready next generation of traction batteries for electric cars. In contrast to lithium-ion cells currently in use, these will consist only of solids and will no longer contain flammable liquid electrolytes. The Fraunhofer ISC contributes its know-how in process development and battery cell production and produces the first prototypes.



<http://swissinnovation.org/news/web/2019/06-190222-a9>

New Findings on Dinosaurs' Extinction

(University of Lausanne, February 22, 2019)

Thanks to the use of a dating method based on minerals collected in India, researchers were able to establish a better correlation between volcanic or meteorite episodes and large extinctions. This helps to understand the environmental dynamics generated by such major catastrophic events and has implications on extinction theories of dinosaurs. The common interpretation was that the extinction of dinosaurs is due to a meteorite impact which triggered very strong volcanic activity on a global scale around 66 million years ago. However, it appears that this volcanic activity was caused by successive paroxysmal impulses, which preceded the meteorite impact by 60'000 years. This period of volcanic eruptions released CO₂ and sulfur dioxide, which had a detrimental influence on flora and fauna, among them the dinosaurs. It is believed that the succeeding meteorite impact ultimately accelerated their extinction.



<http://swissinnovation.org/news/web/2019/06-190222-f6>

Climate Change Upsets Carbon Cycle in the North Atlantic

(Swiss Federal Institute for Forest, Snow and Landscape Research, February 26, 2019)

In the global carbon cycle, oceans play an important role as so-called carbon sinks. On the one hand, carbon dioxide is chemically bound, on the other hand, plankton absorb it from the air through photosynthesis. This process is part of the biological pump which removes carbon from the atmosphere. In a recently published study, researchers from the WSL, together with colleagues from Denmark, the USA, Great Britain and Italy, have demonstrated that climate change had significantly altered this pump in the North Atlantic. The centres of the carbon sinks are shifting towards the north-west. The calculations could also be applied to other oceans and could be incorporated into models that simulate global carbon flux.



<http://swissinnovation.org/news/web/2019/06-190226-c7>

Water Intakes Harm Biodiversity in Alpine Streams

(Eawag, February 28, 2019)

Alpine streams have been extensively modified by dams and water intakes to permit hydropower exploitation. This leads to changes in flow regimes and sediment dynamics, and thus affects the distribution of animal and plant species. Even though, aquatic organisms are adapted to harsh conditions at high altitudes and are tolerant to some disturbances, frequent flushing of water intakes leads to a significant decline in populations of macroinvertebrates like worms and insects. Specialists at Eawag have now found that especially, water intakes are detrimental and sediment management is crucial for the protection of aquatic life. Populations decrease significantly during the summer months, when intake flushing is highest. Even though, once autumn arrives and the flushing is less frequent, the macroinvertebrates rapidly recolonizes, species richness is generally low.



<http://swissinnovation.org/news/web/2019/06-190228-36>

Agriculture Impacts Aquatic Biodiversity

(Eawag, March 04, 2019)

Agricultural practices and wastewater treatment plants are the primary sources of pollution in rivers and streams and can damage the aquatic biodiversity. Until now, the relative influences of the two were unexplored. Therefore, Eawag set up an interdisciplinary team to explore this issue by comparing the water upstream and downstream of a wastewater plant. By doing so, they discovered that the amount of insects and other small invertebrates vary only slightly. However, the influence intensively farmed areas was significant and sensitive species were rare in particular areas. Pesticides are mainly responsible for this result. According to the researchers, these findings highlight the need to substantially reduce pesticide pollution from agriculture

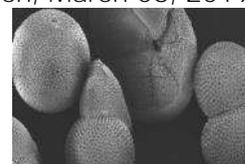


<http://swissinnovation.org/news/web/2019/06-190304-af>

Climate Mystery Solved

(ETH Zurich, March 08, 2019)

ETH Zurich researchers solved one of the mysteries of the earth's climate history. The mid-Pleistocene transition began around one million years ago and caused longer and more intense ice ages. The newly published study shows that one cause of this phenomenon lies in the mixing of deep and surface waters of the Southern Ocean surrounding Antarctica. Ocean waters contain 60 times more carbon than the atmosphere. Consequently, small variations in the CO₂ concentration of water play a major role in climate transitions. The findings show that mixing was significantly reduced at the end of the Mid-Pleistocene Transition, about 600,000 years ago. This reduced the greenhouse effect and prolonged cold climate, causing "global cooling". The results also have implications for the current situation: More intense winds increase mixing which releases CO₂. This trend could, however, be compensated by other effects but to analyze this, better simulations are needed.



<http://swissinnovation.org/news/web/2019/06-190308-f6>

Focus Sustainability at University of Zurich

(University of Zurich, March 08, 2019)

Last month, representatives from 5 higher education institutions in Zurich assembled to converse about the role of universities in sustainability goals. During the panel discussion issues like the ecological footprint of universities or sustainability topics in teaching were addressed. The student organizers reached unanimity on how central the universities' role in promoting sustainable development is. During last year's self-assessment, the University of Zurich gave itself only 5 out of 10 points for their commitment to sustainable development. Since then, it has made strides forward on that front, like approving a new Sustainability Policy. The implementation strategies at both university administration and teaching & research levels are currently being discussed. A representative of University of Zurich mentioned that 2019 is all about sustainability, and during this year's self-assessment, the score increased by one point to 6 out of 10.



<http://swissinnovation.org/news/web/2019/06-190308-a2>

Balance Between Wind Energy and Biodiversity

(EPFL, March 12, 2019)

Researchers of EPFL have devised a simulator that calculates the performance of wind farms over 30 years whilst factoring in the need to preserve local biodiversity. Their aim is to provide the local authorities with a model they can use in a given landscape to simulate the wind energy potential in the long term, taking into account the evolution of the landscape and its biodiversity. This is important for striking the right balance between arable land and pastureland, which can help to generate strong winds, and natural woodland, where the trees





tend to reduce the performance of wind farms. When the right balance is struck, the wind farm can maintain a high percentage of its production capacity, and biodiversity remains high simultaneously. The research indicates that trying to achieve maximum energy output straightaway is an error.

<http://swissinnovation.org/news/web/2019/06-190312-9e>

Oceans Absorb 31% of Man-Made CO2

(ETH Zurich, March 15, 2019)

Not all of the CO2 generated during the combustion of fossil fuels remains in the atmosphere and contributes to global warming. The ocean and the ecosystems on land take up considerable quantities of these man-made CO2 emissions from the atmosphere. The size of this sink is very important for the atmospheric CO2 levels: without it, the concentration of CO2 in our atmosphere and the extent of anthropogenic climate change would be considerably higher. A research team led by ETH Zurich have found that the ocean has taken up from the atmosphere as much as 34 gigatonnes (billions of metric tonnes) of man-made carbon between 1994 and 2007. This figure corresponds to 31% of all anthropogenic CO2 emitted during that time.



<http://swissinnovation.org/news/web/2019/06-190315-94>

Water Filter Wins Innovation Award

(ETH Zurich, March 20, 2019)

Three scientists from ETH Zurich have received the Spark Award 2019, an innovation prize awarded ETH Zurich, for their water filter. They won because the jury deemed their invention not only highly beneficial for society but also economically viable. The filter they invented removes harmful fluoride from drinking water and thus enables access to clean water. Drinking water with a high fluoride content is found in many regions globally. While a small amount of fluoride can prevent tooth decay, higher concentrations can cause fluorosis, which leads to hardening of teeth and bones, or even fluoride poisoning. The charcoal filter developed by the group of researchers is an affordable solution that can give people all over the world access to safe water. Currently, they are preparing the market launch of the product.

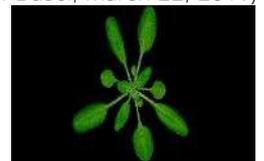


<http://swissinnovation.org/news/web/2019/04-190320-55>

Understanding of Plants' Immune System for Sustainable Crop Production

(University of Basel, March 22, 2019)

Just like any other organism, plants can be injured. The process of how a plant heals or how it avoids infection, have so far not been properly understood. Now, researchers from the University of Basel and from Ghent University have looked into wound reaction mechanisms of plants by focusing a high-precision laser pulse on individual cells. Within seconds, the injury triggered a spike in calcium ions inside the damaged cell. This spike then activated a protein-splitting enzyme known as metacaspase 4, which released a wound hormone and thus warned the neighboring cells. Contrary to the researchers' expectations, the reaction time of plants is equal to that of humans – if not faster. An improved understanding of such alarm mechanisms could help taking advantage of the plant's immune system for pest protection and sustainable crop production.

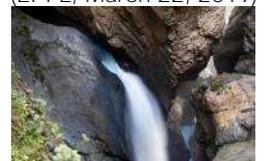


<http://swissinnovation.org/news/web/2019/06-190322-3c>

Earthquake Force Depends on Fluid Viscosity

(EPFL, March 22, 2019)

Fault zones play a key role in shaping the deformation of the Earth's crust. All of these zones contain fluids, which heavily influence how earthquakes propagate. A study from EPFL has now shown that the viscosity of the contained fluids directly affects the intensity of earthquakes. The study focused on geothermal energy project, which can cause earthquakes, known as induced seismicity as opposed to natural seismicity. Such



human intervention like injection wells, mining or geothermal power are done by injecting pressurized fluids into rock fractures. For the study, 36 earthquake simulation experiments were ran with four different fluid viscosities and two types of rock. There was a clear correlation between the force of the earthquake and the fluid viscosity, which in a sense works like an oil by reducing the friction. The study also helps understanding the actual underlying process better.

<http://swissinnovation.org/news/web/2019/06-190322-da>

7. Engineering / Robotics / Space

Earth's Surface and Climate Due to Massive Star Near Sun

(University of Bern, February 12, 2019)

Earth's solid surface and clement climate may be in part due to a massive star in the birth environment of the Sun. Without its radioactive elements injected into the early solar system, our home planet could be a hostile ocean world covered in global ice sheets. This is demonstrated by computer simulations in which the National Center of Competence in Research PlanetS, based at the University of Bern, as well as researchers at ETH Zurich, from the universities of Bayreuth and Michigan, were involved. If there was If our oceans would be covered in ice, it would prevent geochemical processes, such as the carbon cycle on Earth, which stabilize the climate and create surface conditions conducive to life as we know it.



<http://swissinnovation.org/news/web/2019/07-190212-f8>

Prosthetic that Restores Sense of Hand

(EPFL, February 20, 2019)

The next-generation bionic hand, developed by researchers from EPFL, the Sant'Anna School of Advanced Studies in Pisa and the A. Gemelli University Polyclinic in Rome, enables amputees to regain a very subtle, close-to-natural sense of touch. The scientists managed to reproduce the feeling of proprioception, which is our brain's capacity to instantly and accurately sense the position of our limbs during and after movement; even in the dark or with our eyes closed. The new device allows patients to reach out for an object on a table and to ascertain an item's consistency, shape, position and size. The prosthesis has been successfully tested on several patients and works by stimulating the nerves in the amputee's stump. The nerves can then provide sensory feedback to the patients in real time – almost like they do in a natural hand.



<http://swissinnovation.org/news/web/2019/07-190220-1b>

First House Built by Robots and 3D-Printing

(ETH Zurich, February 27, 2019)

The DFAB HOUSE in Dubendorf was recently opened. It is the world's first inhabited "house" that was not only digitally planned, but also – with the help of robots and 3D printers – built largely digitally. For the construction of it, researchers from eight professorships at ETH Zurich have transferred several novel digital construction technologies from the laboratory into real-world applications. The house is designed to showcase how planning and construction can be made more efficient and more sustainable. Not only is it equipped with intelligent household appliances, but it also exhibits a smart energy management. The first resident- academic guests – are soon to move in.



<http://swissinnovation.org/news/web/2019/07-190227-c9>



Public Transportation with Cable Cars

A student at EPFL has examined how cable cars could reshape the urban planning and urban landscape of cities. The student explored how city residents use public transportation to determine whether and how cable cars could supplement commuters' habits. They provide a semi-public means of transportation and allow for a different perspective on cities. In a second step, he examined how effective cable cars are in various urban setting, by comparing different Swiss cities. The results suggested that due to the creation of 3D spaces and the height of cable-car lines, they could serve as a regional development catalyst. Erecting a cable-car station is much more complex than building a bus stop. It can impact several facets of a neighborhood, beyond transportation. The conclusion of the research was that cable cars could constitute a radical form of transportation for certain cities.

<http://swissinnovation.org/news/web/2019/07-190315-f8>

(EPFL, March 15, 2019)



Interspecies Communication Thanks to Robots

Usually, bees and fish do not meet neither would they have much to talk about. However, researchers at the EPFL have been able to build a bridge between the animals, enabling them to exchange some of their dynamic. Through robots as interpreter, the two species transmitted signals back and forth to each other and gradually began coordinating their decisions. These robots were designed by EPFL to blend into groups of animals and influence their behavior. One of the "spy" robots infiltrated a school of fish in an aquarium and got them to swim in a given direction. The study's findings could help robotics engineers develop an effective way for machines to capture and translate biological signals. Biologists, on the other hand, could improve their understanding of animal behavior and interaction within an ecosystem.

<http://swissinnovation.org/news/web/2019/07-190321-e1>

(EPFL, March 21, 2019)



8. Physics / Chemistry / Math

Major Selenium Source in the Alps

The chemical element selenium plays an important role in our immune system and the formation of proteins in our body. But according to estimates, up to a billion people are deficient in selenium. Contents in plants vary greatly and are dependent on the soil and precipitation. The Swiss government is therefore initiating a biomonitoring project to assess the population's health status in relation to selenium. In this context, scientists at Eawag and ETH Zurich have developed new methods and combined them with atmospheric models to understand the origins of selenium. The team collected weekly rain samples and identified precisely where the precipitation came from. After the chemical analysis they concluded that water from the continental biomass represents a major selenium source – and not the marine air masses or anthropogenic sources as assumed. To further understand the correlations, the team will now proceed to conduct measurements in Greenland.

<http://swissinnovation.org/news/web/2019/08-190211-2f>

(Eawag, February 11, 2019)





Physical Forces Imaged Live Inside Cells

(University of Geneva, February 12, 2019)

The detection of physical forces is one of the most complex challenges facing science. Although Newton's apple has long solved the problem of gravity, imaging the physical forces that act in living cells remains one of the main mysteries of current biology. Considered to play a decisive role in many biological processes, the chemical tools to visualize the physical forces in action do not exist. But now, researchers from the University of Geneva and the National Center of Competence in Research in Chemical Biology have developed probes inspired by lobster cooking, they enable to enter into cells. For the first time, physical forces can be imaged live inside the cells. "These new probes now offer us the opportunity to tackle mechanobiology and revolutionize the study of life sciences," explains Stefan Matile from University of Geneva.



<http://swissinnovation.org/news/web/2019/08-190212-95>

Interacting Photons, the Holy Grail of Photonics

(ETH Zurich, February 25, 2019)

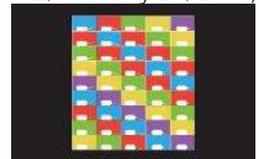
According to the laws of quantum physics, there is no interaction between photons, and two crossing light beams will thus never deflect each another. "Strongly interacting photons are something of a Holy Grail in our field of research", explains Aymeric Delteil, who works at the Institute for Quantum Electronics at ETH Zurich. Sure enough, he and his team have succeeded in manipulating photons in such a way that they now repel each other. A short laser pulse is sent into an optical resonator, inside of which the light is strongly focused and finally hits an ultra-cold semiconductor. At those low temperatures, the photons transform to become so-called polaritons. Between two polaritons electromagnetic forces are acting and hence, the photons contained in them can indeed – indirectly – interact with each other. This is very fundamental research, and the scientists expect the results to find applications in further quantum physics or energy research.

<http://swissinnovation.org/news/web/2019/08-190225-c5>

Bacteria Walk with Pili Extensions

(EPFL, February 25, 2019)

Understanding how bacteria move would significantly help the fight against certain pathogens. A lack of precise tools to visualize bacterial surfaces and filaments, which rule how bacteria interact with their environments, has, however, inhibited the finding of an answer. Using a technique called interferometric scattering microscopy, biophysicists at EPFL were recently able to see filaments in live cells. They found that the so-called pili, nanometer-wide filaments that extend and retract from the surface of many bacteria, help bacteria walk. Apparently, bacteria use sensory mechanisms to coordinate the dynamic motion of pili extension – a succession of surface attachment, retraction, and cell body displacement. Just like higher organisms, bacteria move their limbs to generate a walking pattern.



<http://swissinnovation.org/news/web/2019/08-190225-4f>

Simulation of Railway Noise

(Empa, March 05, 2019)

Railway noise can hinder people from falling asleep at night, therefore, engineering trains and tracks in order to decrease the sound level is important. Empa researchers have designed a computer simulation to demonstrate how railway noise is created, and through which technical measures it can be prevented. Railway noise consists of over one hundred sound sources, which all come together and are responsible for the trains' final sound emission. The researchers developed individual algorithms to imitate more than 100 sounds and additionally took environmental influences like speed, temperature or state of tracks in consideration. A group of volunteers rated the resulting sounds as realistic. In future, the program will support decision-making





regarding construction and expansion of railway lines and train compositions. In the long run, railway operators, planners and mostly residents stand to benefit.

<http://swissinnovation.org/news/web/2019/08-190305-97>

USD 9.1 Million for International Quantum Research

(University of Basel, March 07, 2019)

The project “Quantum Science and Technologies at the European Campus” (QUSTEC) has been selected by the European Commission as a joint international and interdisciplinary doctoral program in quantum sciences and technologies. Together, the involved institutions provide 39 doctoral candidates a training experience in this key emerging area. The program is funded for a five-year period with a total amount of 9.1 million euros, of which roughly half is financed by the EU. The aim of QUSTEC is to address some grand challenges in Quantum Science and work on applications, such as secure communication networks, more precise sensors, the development of new quantum materials and prototype quantum computer. Quantum science is an interdisciplinary field that can lead to new technologies precisely because of the multitude of perspectives.

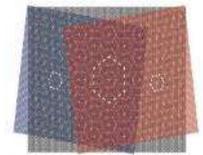


<http://swissinnovation.org/news/web/2019/08-190307-14>

Changing Graphene's Electrical Properties Through Layering

(University of Basel, March 08, 2019)

Last year, researchers discovered that combining an atomically thin graphene and a boron nitride layer at a slightly rotated angle changes their electrical properties. Physicists at the University of Basel have now shown that the combination with a third layer can result in new material properties also in a three-layer sandwich of carbon and boron nitride. When they experimented with three layers, the superposition of them created an even larger superstructure than possible with only one layer. Scientists are very interested in these types of synthetic materials, since they can be used to change or artificially produce new electronic material properties. Put simply, atomic patterns determine the behavior of electrons in a material, and combining different naturally occurring patterns can be used to create new synthetic materials.



<http://swissinnovation.org/news/web/2019/08-190308-f5>

Magnetic Materials' Behavior Examined in Quantum Simulator

(EPFL, March 25, 2019)

A quantum simulator is an artificial device that imitates quantum laws in order to display complex behaviors of systems made up by many interacting particles. One complex system is that of magnets at temperatures close to absolute zero, where magnetic materials undergo a process called “quantum phase transition”. Like other phase transitions – for example ice melting into water – the system switches between two states. Studying this phenomenon in real materials is extremely difficult but physicists at EPFL have now proposed a new “quantum simulator”. It is a laser-based apparatus able to study a wide range of quantum system. Thanks to this new device, the scientists found that photons can behave like magnetic dipoles at extremely low temperatures, following the laws of quantum mechanics. The simulator can be used to better understand the properties of complex materials under such extreme conditions.



<http://swissinnovation.org/news/web/2019/08-190325-21>



9. Architecture / Design

Deep-Learning to Analyze Films

(University of Zurich, February 27, 2019)

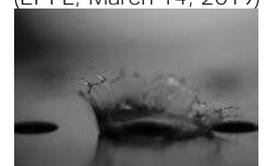
Almost all of the steps in film-making are digital nowadays but only a fraction of films are available digitally. In the future, there's no avoiding digitization projects, however, doing so with historical film material is a complex process – especially where colors are concerned. There's a critical lack of knowledge. The interdisciplinary project FilmColors sets out to tackle this. In order to analyze films made between 1895 and 1995, a team from the University of Zurich has developed the software VIAN (Visual Video Annotation and Analysis), a platform for analyzing and visualizing film material. The software uses deep learning to distinguish between the characters and their surroundings to derive the color. It's remarkably precise and can already correctly identify hair and clothing. VIAN will probably be turned into an online platform to which researchers all over the world can contribute.

<http://swissinnovation.org/news/web/2019/09-190227-a4>

Virtual Time-Lapse Photography for Any Camera

(EPFL, March 14, 2019)

EPFL in cooperation with Harvard University have developed a new image-processing method, able to capture extremely fast phenomena using any type of camera. The method, called Virtual Frame Technique (VFT), works by deconstructing the blurry parts of pictures and illuminating them correctly in order to extract the right information from them. By then applying advanced image-processing methods, the picture is turned into a binary image – containing either black or white pixels. Thus, only two values are required whereas conventional cameras use over 15'000. Giving up the ability to resolve intensity, the developer can use the amount of information obtained by the sensor to increase the frame rate whilst retaining full spatial resolution. On the other hand, temporal resolution can be enhanced by adjusting the timing of a light pulse. Thus, VFT deconstructs a conventional photo of a rapid motion into thousands of images to depict every step of the phenomenon.



<http://swissinnovation.org/news/web/2019/09-190314-0f>

10. Economy, Social Sciences & Humanities

Risks of Eating Disorders Revealed from Childhood

(University of Geneva, February 01, 2019)

Eating disorders – anorexia nervosa, bulimia nervosa or binge eating disorder – usually start in adolescence and often leave young patients and their families helpless. These disorders, that are common, raise the question of early detection. Now, researchers from the University of Geneva and the University Hospitals of Geneva with colleagues from the University of North Carolina, provide new elements that would allow to identify, long before the critical period of adolescence, children who are more likely to be affected by these serious disorders. Indeed, their findings reveal that an abnormally high or low weight from during childhood significantly increases the risk of eating disorders. These results should alert paediatricians to this important public health issue.



<http://swissinnovation.org/news/web/2019/10-190201-82>



Monthly Wages Are Important Step Towards Economic Development

(University of Zurich, February 04, 2019)

Researchers at the University of Zurich wanted to know if Kenyan dairy farmers preferred one large end-of-month payment to daily payments, and on which conditions. When faced with the choice of receiving monthly or daily payment for their milk, 86% of the farmers chose to receive end-of-month payments, even if this meant a 15% lower price per liter. When asked for the reason of this choice, most farmers mentioned that they had set themselves saving goals and did not trust themselves to manage the money over the course of a month. When given the choice between having the option to change back to the daily payments at any stage of the month, or committing themselves to a plan for the whole month, 93% chose not to have that flexibility. These two findings suggest that self-control concerns are the primary driver of the demand for monthly payments.



<http://swissinnovation.org/news/web/2019/10-190204-14>

Behavioral Philanthropy

(University of Geneva, February 05, 2019)

The University of Geneva creates a new chair which is unique in Europe. It promotes research and teaching in an emerging discipline at the crossroad between behavioral finance, economics, psychology and neuroscience. The Edmond de Rothschild Foundations Chair in Behavioral Philanthropy will allow for new approaches in the field of philanthropy. It is embedded in the strategy followed by the University of Geneva and the Edmond de Rothschild Foundations, both committed to promoting research and teaching in philanthropy, and is supported by the Center for Philanthropy at University of Geneva. Assistant Professor Giuseppe Ugazio will occupy the new chair, he is graduate from the University of Zurich and a Harvard University post-doctoral researcher. He holds two PhDs, one in philosophy and the other one in neuro-economics.



<http://swissinnovation.org/news/web/2019/02-190205-fe>

Preference for eServices Unless Involvement of Personal Data

(Zurich University of Applied Sciences, February 06, 2019)

In Switzerland, public services are increasingly being provided in electronic form. In these so-called eServices, however, Switzerland is still lagging behind in international comparison and has to catch up if it wants to strengthen its location factor. Which needs and concerns of the population on the way to the digital administration are to be taken into account, a recent Zurich University of Applied Sciences study examined. According to the survey, the surveyed population prefers eServices compared to analogue services. However, the preference for eServices decreases as soon as personal information is involved. "Data security and data protection play a key role for the users of eServices," explains Alexander Mertes. The study further shows that analogue services for the population still have to be available for the population.



<http://swissinnovation.org/news/web/2019/10-190206-ad>

Tax Holidays as Foreign Direct Investment Incentive

(University of Lausanne, February 07, 2019)

A popular method for attracting foreign direct investment is to provide tax incentives, such as tax holidays, for inward investing firms. However, in a highly mobile global economy, the challenge for host nations is persuading firms to stay after tax incentives are reduced or withdrawn, as it is relatively easy for firms to close and move to take advantage of tax breaks offered elsewhere. This is an issue that researchers at University of Lausanne and University of Porto have been investigating. Using data from Puerto Rico, where tax holidays (tax exemptions that are subsequently eliminated) were used to attract foreign firms, the research identifies



three factors that affect an investing firm's sensitivity to reductions in tax benefits: Information asymmetry, degree of friction in terms of the ease of relocating and industry clusters exerting a gravitational pull.

<http://swissinnovation.org/news/web/2019/10-190207-d8>

Overestimated Long-Term Effects of Life Events

(University of Basel, February 11, 2019)

People tend to be bad at predicting their subjective well-being, report researchers at University of Basel. For their study, they used data from a long-term survey of more than 30,000 people. They compared predicted life satisfaction with what the participants actually reported five years later. They focused on people who had experienced major life events (e.g. marriage, the death of a partner, invalidity, unemployment, separation or divorce). As expected, the examined life events had a significant impact on the subjective well-being of those affected: Positive events were linked to a strong increase in life satisfaction, and negative events to a strong decrease. However, people systematically underestimated how long the effect of an event would continue. The fluctuations in life satisfaction did not last long, but rather swung back completely or partially to the long-term level of previous years.



<http://swissinnovation.org/news/web/2019/10-190211-5e>

Ethical Issues of Human Enhancement Technologies

(University of Geneva, February 11, 2019)

Human enhancement technologies are opening up tremendous new possibilities. But they are also raising important questions about what it means to be human, and what is good or bad for our individual and collective well-being. These technologies are currently geared towards upgrading or restoring physical and psychological abilities for medical purposes. An application is surfacing, however, that is designed with another goal in mind: embellishing performance. Although using this technology is very much an individual choice, it nevertheless has an impact on society as a whole. An international team of researchers headed by the University of Geneva and Oxford University has been examining the ethical issues arising from these experiments. Their research questions and highlights the conflict between individual and collective well-being, together with the important role governments have to play.



<http://swissinnovation.org/news/web/2019/12-190211-44>

Discrepancies Between Media and Research Interests

(Eawag, February 14, 2019)

A study by an environmental social scientist at Eawag shows that reports in the media do not always reflect the issues that most concern organisations, public sector agencies, cantons and communities on a day-to-day basis. These discrepancies are quite natural, explains a political scientist based at Eawag. The media are often one step ahead, and they pick up on public fears a lot more quickly. Researchers consider the results of the study important for future research projects: in order to feel the pulse of Switzerland, it makes sense to conduct surveys in the field, as well as to undertake media analyses.



<http://swissinnovation.org/news/web/2019/10-190214-ce>

Attainable Personal Goals Contribute to Well-Being

(University of Basel, February 15, 2019)

Life goals express a person's character, as they determine behavior and the compass by which people are guided. It can therefore be assumed that goals can contribute substantially to how satisfied people are in life or how dissatisfied if important goals are blocked and cannot be achieved. The participants of a study conducted by psychologists from the University of Basel assessed the importance and the perceived



attainability of life goals in ten areas: Health, community, personal growth, social relationships, fame, image, wealth, family, responsibility/care for younger generations, and work. The findings revealed that perceiving one's personal goals as attainable is an indicator for later cognitive and affective well-being. This implies that people are most satisfied if they have a feeling of control and attainability. Interestingly, the importance of the goal was less relevant for later well-being than expected.

<http://swissinnovation.org/news/web/2019/10-190215-02>

Flat-Rate Payment Structure Accompanied by Increase in Readmission Rates

(University of Basel, February 15, 2019)

In 2012, a flat-rate payment structure for inpatient hospital services was introduced across Switzerland in the form of the Swiss Diagnosis Related Groups. Researchers from the University of Basel and the cantonal hospital of Aarau have conducted the first broad-based study on the impact of the new reimbursement model. Specifically, they investigated the impact of the new hospital reimbursement model on length of hospital stay as well as on in-hospital mortality and 30-day readmission rates; important indicators of efficiency and quality of care. It was clear that the length of hospital stay decreased steadily, from 8 to 7.2 days – a trend that has not accelerated with the introduction of the new reimbursement system. Similarly, in-hospital mortality also decreased over the study period. On the other hand, the rate at which patients returned to hospital within 30 days of discharge increased from 14.4% to 15.0%.



<http://swissinnovation.org/news/web/2019/10-190215-0d>

Effect of Income and Attitude on Greenhouse Gas Emissions

(ETH Zurich, February 15, 2019)

Researchers at ETH Zurich found that the group with the highest greenhouse gas emissions burdens the climate roughly six times more than the group with the lowest emissions. The differences are most pronounced when it comes to mobility: the 10% emitting the most greenhouse gases are responsible for 23 times more emissions than the 10% that emit the least. In terms of housing, the emissions of the most prolific greenhouse gas emitters are 4.7 times higher, but only 1.3 times higher when it comes to food. As expected, greenhouse gas emissions increase with income. But surprisingly the effect of income is lower than expected, as it accounts for just one tenth of the differences in emissions. As for climate gases from food, income plays no role, food-related emissions do not differ according to income. This is where environmental awareness comes into play.



<http://swissinnovation.org/news/web/2019/10-190215-1f>

Next Generation: Young Researchers

(Swiss Academy of Humanities and Social Sciences, February 19, 2019)

Alternative career paths are needed at Swiss universities. The Swiss Academy of Humanities and Social Sciences came to this conclusion in its publication "Next Generation". The representative institution of the Swiss non-professorial teaching staff now also demands this in a newly published position paper. Actionuni, the umbrella organization of the Swiss non-professorial teaching staff, demands, among other things, "that career paths must be diversified to offer young researchers a variety of perspectives for their future. There must be more than the professorship as the only permanent scientific position. In addition, flatter hierarchies and more integrative working models need to be created, which make it possible to distribute the scientific responsibility to all members of a research team.

<http://swissinnovation.org/news/web/2019/12-190219-a0>



Agony of Choice: Visualizing Mental Valuation Processes

(ETH Zurich, February 19, 2019)

Shopping in a supermarket can sometimes be an agony of choice. So many foods to choose from! And yet, we don't take hours to decide what we like to eat. Most of the time, we make decisions for or against certain products quickly and without much deliberation. That has less to do with our decisiveness and more to do with the incredibly efficient way the brain processes information. Researchers at ETH Zurich, the University of Zurich and Columbia University have now mapped this process in a new computer model. "The new model accurately predicts which food the test subject will choose in the vast majority of cases," says Rafael Polanía from ETH Zurich, "and also how often you will change your mind".



<http://swissinnovation.org/news/web/2019/05-190219-9c>

Adjusting Environment to Children ADHD

(Zurich University of Applied Sciences, February 21, 2019)

The Attention Deficit Hyperactivity Disorder (ADHD) is now considered one of the most common childhood mental disorders worldwide. Often, the deficit and not the child is at the center of investigation. Now, a study conducted by Zurich University of Applied Sciences and University of Fribourg has focused on the best interests of the child. It was examined why parents decide in favor of a drug treatment for their children. In addition, experts were asked to work together with children having ADHD and to find the causes of the disorder. The research results have been included in a brochure with recommendations for action. "Central is the change of perspective that puts the child at the center," explains Dominik Robin from Zurich University of Applied Sciences.



<http://swissinnovation.org/news/web/2019/10-190221-38>

Well-Integrated Foreign Workforce

(HR Today, February 27, 2019)

The HR-Barometer 2018, a barometer of public opinion, conducted by professors of the Universities of Zurich and Lucerne, interviewed employees about their work situation. The results regarding the discrimination of foreign staff demonstrated that they perceive little to no discriminatory behavior. However, there are situations in which they identify unequal or unfair treatment. This perception is concentrated in the application process, the reimbursement or the recognition of job-related qualifications. In general, they feel more discriminated by customers and colleagues than by employers. It seems that the amount to which foreign employees feel discrimination influences their propensity to terminate the employment, their susceptibility to stress and thus, overall workplace performance. Language barriers constitute one of the main problems. As a result of the barometer, some policy implications for HR departments were deduced, among them is the offering of free language courses by the company.

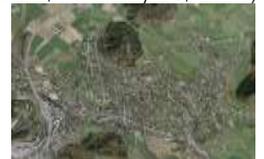


<http://swissinnovation.org/news/web/2019/10-190227-5f>

Innovative Rural Development

(University of Bern, February 28, 2019)

For a long time, policy and research on urban development have primarily focused on large cities. Now, an interdisciplinary team of researchers funded by the Swiss National Science Foundation have analysed small and medium-sized towns (SMSTs) in Switzerland. The researchers grouped 152 towns into seven types of SMSTs based on existing data sets. In the process, they discovered that SMSTs have very different economic characteristics. According to the researchers, European policy and research have been discovering small towns since about 2015. This is probably due on the one hand to life in big cities becoming too expensive and on the other hand to the fact that SMSTs are now easily accessible and attractive.



<http://swissinnovation.org/news/web/2019/10-190228-f3>

Small Steps Lead to Peace

(ETH Zurich, March 08, 2019)

Dekha Ibrahim Abdi, a Kenyan mediator, and Simon Mason, an ETH researcher, have developed a novel conflict mediation approach. It is called Short-, Medium-, and Long-Term Linkages (SMALL) Framework for Peace. After the two realized that many of the mediation approaches developed in secure and stable states like North America and Europe cannot be transferred to fragile contexts, their approach specifically combines the local, gender-, culture- and conflict-specific perspective with the academic perspective. The framework contains the following features: Mediation is the short-term measure to resolve an acute conflict through a negotiated agreement. However, to contribute to stable, long-term governance, medium-term measures such as the establishment of "local peace committees" are crucial, where both the traditional and modern governance systems are involved. Many small, local steps may lead more sustainably to peace than big dreams of the perfect state.



<http://swissinnovation.org/news/web/2019/10-190308-31>

Big Data for Linguistic Research

(University of Zurich, March 15, 2019)

Previously, theories used to be devised at the desk. Nowadays, however, work has moved to controlled data collection and analysis. The University of Zurich has begun to conduct research on the human language and examines, for example, the frequent complaint that the digital age barbarizes our language. To examine this, millions of text messages must be analyzed, wherefore huge amounts of storage and software are required. Until 2025, over USD 8 million will be invested in providing the required infrastructure, such as laboratories, IT-technology and high-tech devices for sound and video recording. Additionally, neurolinguistic equipment will be purchased to improve understanding of language processing in the brain. Applications reach from research into the way young children acquire language to analyzing hearing impairments and loss in old age.

<http://swissinnovation.org/news/web/2019/10-190315-04>

Marital Sorting in Switzerland

(University of Neuchâtel, March 19, 2019)

When choosing a partner, Swiss people are increasingly looking for someone with similar educational attainment or income. This phenomenon is often referred to as assortative mating and frequently named as a main cause for household income inequality. Researchers at the Universities of Lausanne and Neuchâtel recently published a study which came to this result. Mostly people with lower education seem to marry increasingly homogeneous. For low-educated males, the probability to remain single is high. Additionally, the study found a correlation between single households and education, namely that females and males with a tertiary degree are most likely to live alone. An interesting finding resulted from the combination of income and education. The researchers found that couples with similar income often consist of a female with a higher educational degree. It is expected that the degree of marital sorting according to education or income is going to further increase in the future. This result is insofar not surprising as most people meet their prospective spouses at their workplace or during their studies.

<http://swissinnovation.org/news/web/2019/10-190319-00>



11. Start-ups / Technology Transfer / IPR / Patents

Future Food Initiative

(ETH Zurich, February 04, 2019)

ETH Zurich and EPFL, in cooperation with their longstanding Swiss industry partners Bühler, Givaudan and Nestlé, are launching the Future Food Initiative. The goal of Future Food – A Swiss Research Initiative is to invest in Swiss food and nutrition research and intensify the transfer of knowledge from universities to companies. The core of the initiative is a new fellowship program at ETH Zurich and EPFL designed to attract talented individuals from Switzerland and abroad to conduct research and innovation within the industrial sector in Switzerland. The Future Food Initiative is dedicated to tackling the major challenges of sustainable food supply. The main focus is on developing high-quality, healthy and affordable food products that, for example, keep pace with consumer trends or help to solve malnutrition and starvation. Research is also underway to explore new packaging solutions as alternatives to plastics.



<http://swissinnovation.org/news/web/2019/11-190204-e2>

88 Costumed Drones on Word's Largest TV Program

(Verity Studios, February 06, 2019)

Verity Studios AG, the global leader in indoor drone systems, and Keey Media, a leading smart entertainment company in China, recently announced that 88 Verity Studios drones were chosen to be featured in the CCTV New Year's Gala. It is the world's most-watched TV program; the event was broadcast live to an estimated 1 billion viewers across the globe. With 88 Lucie® micro drones flying over performers in red Chinese lantern costumes, this is the largest number of costumed drones ever seen in a performance. Sponsored by TikTok, a leading social media platform in Asia, the show opened to "The Distance of Time", sung by popular singer Sun Nan and up-and-coming pop star Jason Zhang. As the song builds, 88 Lucie micro drones flew from the back of the stage like butterflies to dance above the 50 performers dressed as blossoming cherry trees.



<http://swissinnovation.org/news/web/2019/11-190206-a0>

Fast Tumor Analysis System

(EPFL, February 07, 2019)

Lunaphore's tumor analysis system LabSat™ detects and classifies tumors more quickly and reliably than existing solutions. The microfluidic system, developed through at EPFL, is designed for use by research labs, pharmaceutical companies and hospitals. This is the first product that the company has marketed since its founding in 2014. The underlying technology is immunohistochemistry, which is widely used in diagnostic practice. It identifies tumor-specific biomarkers in a given tissue sample. The tissue sample is stained with labeled antibodies and then viewed under a microscope. Researchers can then visually ascertain the presence and location of any tumor-specific biomarkers. This process normally takes several hours, but with LabSat™, tumor biopsy results are available in a matter of minutes.



<http://swissinnovation.org/news/web/2019/11-190207-e7>

Record 29% Efficiency of Residential Solar Panels

(EPFL, February 19, 2019)

The solar panels developed by EPFL spin-off Insolight stand apart from other rooftop solar panels. They deliver yields of 29%; nearly twice as much as the others currently on the market (yields of 17–19%). Insolight's panels use a patented optical system that concentrates sunlight on a kind of miniature photovoltaic cell normally used in satellites.





These cells are efficient but also expensive. To keep costs down for the retail market, Insolight developed a protective glass on which optical lenses can be placed that concentrate sunlight by some 100x and direct it to the tiny surface of the high-performance cells. That means the cells need to take up less than 0.5% of the solar panel surface. The founders also designed a mechanism that can move the cells horizontally by a few millimeters each way in order to follow sunlight throughout the day.

<http://swissinnovation.org/news/web/2019/11-190219-3d>

Startup BioLingus Partners Up With Mega Pharma

(startupticker.ch, February 20, 2019)

BioLingus, with headquarters in Hergiswil and offices in Hong Kong and Australia, is specialized in the development of oral (sublingual) delivery of peptides and proteins for chronic diseases and immunotherapy. The startup developed a technology that enables transforming injectable medicines into pills that go under the tongue. Biolingus' technology is internationally patent protected and has received numerous awards. The startup has now entered a partnership with STA Pharmaceutical Co., (WuXi STA), a subsidiary of WuXi AppTec, a global pharmaceutical and medical device open-access capability and technology platform company with global operations and over 16'000 employees worldwide. The WuXi platform enables more than 3,000 innovative collaborators from over 30 countries to deliver innovative healthcare products to patients.



<http://swissinnovation.org/news/web/2019/11-190220-74>

Non-Polluting Membrane for Outerwear

(ETH Zurich, February 21, 2019)

Outdoor sports are booming – as is the entire sports apparel segment. Demand for breathable and waterproof rain jackets is particularly high, as people like to be outdoors whatever the weather. The drawback is that this type of clothing often uses membranes containing toxic fluorine compounds that can be damaging to health and the environment. Researchers at ETH Zurich have joined forces to establish the spin-off Dimpora. Dimpora's new product is based on polyurethane. It is already so far advanced that it can be incorporated into jacket prototypes for testing by athletes. Based on their feedback, the founders want to continue to improve the membrane and hopefully bring it to market for sports and outdoor clothing brands by the end of the year.



<http://swissinnovation.org/news/web/2019/11-190221-82>

Startups Team Up to Set New Standards in IoT Security

(startupticker.ch, February 22, 2019)

GEOSATIS offers the most secure, reliable and innovative electronic monitoring solution for enhanced public safety and successful offender rehabilitation. GEOSATIS expertise lies in the design and operations of highly secure geo-localized connected devices and systems. The partnership with ARCATrust, a company whose expertise in cryptography and hardware & software security, represents a great opportunity for both companies to collaborate and raise the bar to set a new standard in terms of IoT security within a field as sensitive as the criminal justice sector. ARCATrust offers hardware and software platform solutions for storing and managing digital assets dynamically, with a design approach that consists in strongly binding its HW system with business-oriented SW to deliver best in class security.



<http://swissinnovation.org/news/web/2019/11-190222-09>

12. Calls for Grants/Awards

Call: Support Program for Universities of Applied Sciences Graduates

(Gebert Rüt Stiftung, January 03, 2019)

Under its «BREF – Brückenschläge mit Erfolg» area of activity, Gebert Rüt Stiftung has been promoting selected research and development projects as exemplary drivers of Switzerland's universities of applied sciences since 1997. In cooperation with «swissuniversities», annual call for papers are issued for this purpose. The focus is on creating a bridge between science, business and society. It is at this interface that universities of applied sciences can develop innovative solutions. Under the banner of «First Ventures» Gebert Rüt Stiftung promotes bachelor's and master's students of universities of applied sciences who are developing an innovative business idea as their thesis topic. The support includes a financial contribution as well as an individually tailored coaching program which will smooth the way to launching a start-up. For this focus program funds of CHF 1.5 million p.a. will be made available. The next submission deadline is May 5, 2019.

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<http://swissinnovation.org/news/web/2019/13-190103-54>

Call to Improve Framework Conditions for Startup Ecosystem

(startupticker.ch, February 21, 2019)

For the first time, the main players in the Swiss startup ecosystem have signed a joint text: the Swiss Startup Manifesto. More than 600 signatures call for ten measures to improve the framework conditions. Federal Councilor Guy Parmelin showed great interest in a sustainable dialogue with the startup ecosystem during the presentation of the manifesto. But he also emphasized the need to coordinate the views of the ecosystem: The Federal Council needs a contact person who reflects the voice of the ecosystem. The manifesto for Swiss start-ups proposes ten measures. They all aim to facilitate the creation of companies based on science, investment, access to capital and talent. The momentum is positive: according to the Swiss Venture Capital Report, Swiss startups raised more than USD 1.2 billion last year.



<http://swissinnovation.org/news/web/2019/12-190221-44>

Call: Young Scientists Mobility Grants with MENA Countries

(University of Applied Sciences Western Switzerland, January 03, 2019)

The State Secretariat for Education, Research and Innovation (SERI) has commissioned the HES-SO as Leading House for the Middle East and North Africa (MENA) region. The following countries have been identified as priority countries for the first phase: Egypt, Lebanon, Morocco, Palestine, Qatar, Tunisia and the United Arab Emirates. The mobility grants can be awarded to young scientists who hold a bachelor's or master's degree but no PhD yet, and with not more than 6 years of professional research experience. The call is open for activities in all scientific disciplines and fields of research. Activities may include field work and/or an internship in relation to the applicant's research project. The applicant's mobility visit should have a minimum duration of 4 weeks and the amount not more than CHF 5,000 per grant. Applications will be accepted until December 31, 2019.

Hes·so
Haute Ecole Spécialisée
de Suisse occidentale
Fachhochschule Westschweiz
University of Applied Sciences and Arts
Western Switzerland

<http://swissinnovation.org/news/web/2019/13-190103-8c>

Upcoming Science and Technology Related Event

Aging & Cognition 2019

April 24-26, 2019

<http://eucas.org/ac2019/>

Cognitive Neuroscience, Healthy Aging
Zurich

Women in Cybersecurity

May 2, 2019

<https://is.gd/pSrhaX>

Female Workforce, Cyber Tech
Geneva

Swiss Biotech Day

May 7, 2019

<http://swissbiotechday.ch/>

Finance, Production, Licensing
Basel

Apéro: Smart Solutions for Climate Change

May 8, 2019

<https://is.gd/81B1m0>

Global Warming, Energy Policy
Interlaken

Change- Energy World in Transition

May 14, 2019

<https://is.gd/azGk2R>

Energy Sources, Society 2.0
Bern

FETE DE L'INNOVATION

May 28, 2019

<https://is.gd/l6W2IH>

Accelerator Programs, Pitching Event
Geneva

Smart Health 2019

June 25, 2019

<https://is.gd/jhEEoZ>

Advanced Therapies
Basel

Conference of Science Journalists

July 1-5, 2019

<https://www.wcsj2019.eu/>

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