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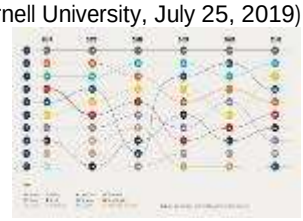
Science-Switzerland, June-July 2019

News on Swiss science, technology, education and innovation

Table of Contents

Switzerland: Global Innovation Leader for the Ninth Time

(WIPO, INSEAD & Cornell University, July 25, 2019)



Switzerland is yet again the most innovative country according to the Global Innovation Index 2019 published by World Intellectual Property Organization (WIPO), INSEAD and Cornell University. The Alpine nation has demonstrated its prevalence in the field of innovation for the 8th time in a row, consistently topping the index since 2011, an extraordinary feat attesting to the strength of the small Alpine nation's innovation ecosystem and the quality of its public higher education institutions. The main strong points for Switzerland are the knowledge and technology output - including knowledge creation and patent applications - as well as ICT and business model creation. China leads the upper middle-income countries group and ranks 14th overall (moving up 3 positions from its 2018 ranking), maintaining top ranks in patents by origin, industrial designs, and trademarks by origin as well as high-tech net exports and creative goods exports.
http://swissinnovation.org/news/web/2019/00-190725-ce

Best of swissnex 2018

(The Federal Council, June 03, 2019)

In 2018, the swissnex network held 320 events throughout the world with 180 Swiss partner organisations. "Best of swissnex" is the motto of the swissnex Network's 2018 annual report, published on its website at www.annualreport.swissnex.org. The review of 2018 takes a look at the activities of the five swissnex locations and 22 science counselors at Swiss embassies around the globe, who pursue the shared objective of supporting the outreach and engagement of Swiss institutions and individuals operating in the field of education, research and innovation. swissnex's mission is to support the outreach and active engagement of its partners in the international exchange of knowledge, ideas and talent. The five swissnex locations and their outposts are established in the world's most innovative hubs.
http://swissinnovation.org/news/web/2019/00-190603-f9

1. Policy

Federal Councillor Guy Parmelin Visits Japan and Vietnam

(The Federal Council, July 05, 2019)

In July, Guy Parmelin, head of the Federal Department of Economic Affairs, Education and Research EAER and Federal Councillor, led a business and science delegation to Japan and Vietnam. The focus of talks with governments in both countries was on free trade agreements. The accompanying representatives from Swiss firms and the Swiss education, research and innovation landscape had access to decision makers on economic policy. With a bilateral trade volume of over CHF 12 billion, Japan is one of the most important trading partners in Asia. The aim of the visit to Japan was ultimately to further deepen that cooperation, also in respect of the bilateral free trade and economic partnership agreement. As for Vietnam, the country's economy has been growing at an above-average rate for several years and offers interesting opportunities for foreign investors. In talks with the Vietnamese government, the continuation of negotiations on a free trade agreement was on the agenda.
http://swissinnovation.org/news/web/2019/01-190705-6b

2. Education

ETH Zurich on Rank 6 in the World

(ETH Zurich, June 19, 2019)

In the latest QR World University Rankings published in June, the ETH Zurich has climbed up further and comes in at an astonishing 6th rank globally - the best it ever had. It is additionally the second-best university in Europe, only outmatched by the University of Oxford in England. University President Joël Mesot mentions how this continuous upward trend over the past years was possible only thanks to the excellent skill and high commitment level of the university's staff. Mesot points out that even though such rankings should be taken with a grain of salt, this was nonetheless proof of ETH Zurich's ability to compete internationally in teaching, research and technology transfer. The top spot in this year's ranking has been taken once again by the Massachusetts Institute of Technology followed by Stanford University and Harvard University. Other than ETH Zurich, EPFL (rank 18) and University of Zurich (rank 76) were represented in the top 100.
http://swissinnovation.org/news/web/2019/00-190619-37

21 New Professors at ETH and EPFL

(The Federal Council, July 11, 2019)

The two Swiss Federal Institutes of Technology have appointed a total of 21 new professors. The President of ETH Zurich, Professor Joël Mesot, and the President of EPFL, Professor Martin Vetterli, have made the appointments after their meeting mid-July. At ETH Zurich, 13 new professors will start, four of which are women and nine are men. Six of them will be employed either at the Department of Computer Science or the Department of Information Technology and Electrical Engineering, two are in medical related fields. At EPFL 8 are getting tenure of which 3 are female, 5 male and their fields and backgrounds are varied. Many are from renowned institutions such as MIT, Stanford or Harvard. Additionally, two professors left ETH Zurich and were thanked during the meeting.
http://swissinnovation.org/news/web/2019/02-190711-61

3. Life Science

Copying Genes Allowed Stickleback to Colonize Freshwater

(University of Bern, June 03, 2019)

The principle of adaptive radiation states that in a competitive situation, some individuals in a species find new niches, whereas other might not. This phenomenon leads to numerous species evolving from one single original species. Exactly this is what happened to the stickleback: The three-spined stickleback managed to adapt from seawater to freshwater, however, the Japanese sea stickleback in contrast never managed to do so. Why these evolutionary variations occur has been a question for a long time. Biologists of Eawag, the University of Bern and the National Institute of Genetics in Shizuoka, Japan, have discovered the responsible gene, named Fads2, in the genetic material. It converts unusable fatty acids into useful ones, which is particularly important in freshwater to avoid starvation. The three-spined stickleback made copies of the Fads2 over time which helped its adaption, the Japanese sea stickleback in contrast did not.
http://swissinnovation.org/news/web/2019/03-190603-4c

Height and Mortality Rate

(University of Zurich, June 04, 2019)

The University of Zurich (UZH) recently hosted an international symposium which focused on how height influences our health. Almost 80% of variation in body height is accounted for by genetics but environment as well as socioeconomic status are additional determinants of whether we reach our genetic maximum height. In Switzerland, it is assumed that due to the good nutrition and medical care women and men have reached their maximum height averaging at 166 cm and 178 cm, respectively. An interesting research area in this regard is the connection between body height and mortality rates in Switzerland which a team of UZH has focused on. In contrast to studies conducted elsewhere that found correlations between cardiovascular disease and a smaller-than-average height differing results. According to them, the tallest women had significantly higher mortality rates than shorter-than-average women, even after controlling for socioeconomic determinants. There are various explanation approaches.
http://swissinnovation.org/news/web/2019/03-190604-3e

Brain Breaks Down Pathological Protein Aggregates

(ETH Zurich, June 05, 2019)

Aggregates of the protein alpha-synuclein in the brain's nerve cells play a key role in Parkinson's and other neurodegenerative diseases. These protein clumps travel from nerve cell to nerve cell, causing the disease to progress. A research team from ETH Zurich, University Hospital Zurich and the University of California San Diego have discovered how the body can rid itself of these damaging aggregates. Fibrils are long, microscopic fibers, to which large numbers of alpha-synuclein molecules can aggregate. Using cell culture experiments, the researchers showed how fibrils enter healthy cells and accumulate within them. A protein complex called SCF detects them and targets them to a known cellular breakdown mechanism, thereby preventing their spread. These findings might enable new approaches in the treatment of neurodegenerative diseases.
http://swissinnovation.org/news/web/2019/03-190605-91

Importance of Brain Activity in Retirement

(University of Zurich, June 05, 2019)

As people age, brain mass decreases and the cortex becomes thinner. However, this decrease and thinning does not directly translate into worse cognitive skills. Many elderly people who have an extremely thin cortex are mentally and physically still fit and active. Studies show that there is often a decline in cognitive skills shortly after retirement, which is not surprising insofar as many decide to relax and unwind after leaving the workforce. This is detrimental to the brain though and it is important to keep active in order to retain the cognitive skills. The question of how to do this arises and the answers are not conclusive. Doing puzzles such as Sudoku or other brain training exercises improve a certain skill but cannot more broadly be applied to other life situations. It is important that pensioners have a variety of different stimulation including some physical activity.
http://swissinnovation.org/news/web/2019/03-190605-03

Telephone-based Coaching Encourages Exercise

(University of Basel, June 24, 2019)

Physical activity is effective in minimizing various health risks – regardless of gender, age and fitness level – yet many people lack the time and motivation to engage in regular physical activity. There are numerous programs designed to help people start exercising, but there is uncertainty as to which interventions work in everyday life and motivate busy individuals to become more physically active in the long term. In a study involving 288 inactive adults over six months, sports scientists from the University of Basel discovered that providing

personalized telephone-based coaching is an effective method for getting people in Switzerland to exercise more. Two Swiss health insurers are currently testing phone-based diets and exercise coaching. The Canton of Basel-Stadt is also developing a health-coaching program for its staff.
http://swissinnovation.org/news/web/2019/01-190624-2e

Making Work Capability Assessments More Consistent

(University of Basel, July 03, 2019)

On behalf of social security institutions, psychiatrists assess to what extent people with mental health problems are still able to work. However, the work capability assessments tend to be far too dissimilar. A new training course for psychiatrists has helped to reduce the differences. This has been confirmed by a study conducted at the University of Basel and the University Hospital of Basel. In the new evaluation process, psychiatrists focused on work, rather than on the mental illness. In a follow-up study, researchers would like to test whether further improvement is possible if the psychiatrists receive even more intensive training.
http://swissinnovation.org/news/web/2019/01-190703-a3

Thermoregulatory Neurons and REM Sleep

(University of Bern, June 05, 2019)

When people sleep, they cycle between rapid eye movement (REM) phases and non-REM phases. In the former phase, which is entered once a person falls asleep, breathing is slow and regular, and movement of limbs and eyes are minimal. 1,5 hours later, REM sleep starts which is marked by fast and irregular breathing, twitching limbs and rapidly moving eyes. During this time, the brain is highly active, and the body loses the ability to thermoregulate or maintain a constant body temperature. This loss of thermoregulation is an odd aspect of sleep as this ability is usually very important. Researchers of University of Bern and Inselspital Bern have discovered that a small population of neurons within the hypothalamus, called melanin-concentrating hormone neurons, play a critical role in how we modulate REM sleep expression as a function of room temperature. These findings will help with advances in sleep medicine.
http://swissinnovation.org/news/web/2019/03-190605-3d

Food Choices Influenced by Social Interactions

(University of Geneva, June 07, 2019)

Our food choices often influenced by our environment. Researchers at the University of Geneva conducted an experiment with mice, where one mouse was the observer and the other was the demonstrator. The experiment worked as follows: Mice have a clear preference of thyme over cumin, however, one mouse - the demonstrator - was trained to like cumin. After consuming cumin flavored food, the demonstrator and the observer were put into the same cage for 30 minutes. One day later, the observer mouse was presented with a choice of two meals, one with cumin and the other with thyme. The observer mouse then showed an interest in cumin, indicating that the information has been transmitted through odorous cumin molecules the day before. The neurons engaged during the study were marked and it was not only found that they receive information from the olfactory sensory cortex but also that inter-neural communication was modified.
http://swissinnovation.org/news/web/2019/03-190607-05

First Synthetic Mechanism Used as Artificial Genetic Regulatory Network

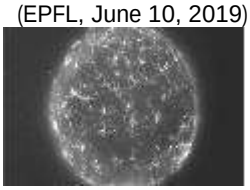
(ETH Zurich, June 09, 2019)

The human body ensures that the calcium concentration in the blood remains constant. In the same way, an aircraft's autopilot keeps the plane flying at a constant altitude. What they have in common is that both the body and the autopilot employ sophisticated integral feedback control mechanisms. Researchers in the Department of Biosystems

Science and Engineering at ETH Zurich in Basel have now succeeded for the first time in building such an integral controller completely from scratch within a living cell. Their synthetic biology approach might, among other things, make it possible in the future to optimize biotechnological production processes and to regulate hormonal activity through cell therapy.
http://swissinnovation.org/news/web/2019/03-190609-c0

How the Cholera Bacterium Survives in the Natural Environment

(EPFL, June 10, 2019)



Over the course of the last decade, a research group at EPFL established that the cholera bacterium produces "ropes", otherwise known as "type IV pili" only when growing on chitinous surfaces. They also showed that these pili are essential for DNA-uptake. But how exactly they functioned and what else they might be capable of doing had remained somewhat elusive. Recently the same research group has discovered, that pili also help bacteria bind to nutritious surfaces and they also help recognize other cholera bacteria. Understanding how the cholera bacterium survives in the natural environment is important to better understand the transmission to humans in cholera endemic regions.
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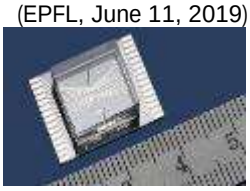
Human Tissue Imitate to Test Cancer Therapy

(EPFL, June 11, 2019)



To develop and test new therapies for cancer, researchers need imitates of human tissue. Groups of cells created in controlled laboratory conditions, referred to as cell aggregates, are a well-suited possibility to do such tests. Researchers at EPFL and University of Lyon have recently invented a method for creating cell aggregates in a fully controlled manner. The scientists developed a device in the size of a microchip which employs electric fields to control number and behavior of the cells used to form the aggregates. The technique uses human embryonic kidney cells that are trapped in the center of the device and then form an aggregate. This is an important step towards creating organoids - they consist of various cell types and can reproduce the functions of an organ - of a desired size and composition.
http://swissinnovation.org/news/web/2019/03-190611-04

Inventory of Natural Compounds to Mine New Drugs

(University of Basel, June 11, 2019)

Some of the most potent medicines on the market come from natural products or their close derivatives. Macrocycles have a large carbon-rich ring system and are one class of such derivatives. At the University of Basel, researchers conducted a complex molecular synthesis of various compounds attached to a unique identifying DNA strand and could, thus, build a rich collection of natural product-like macro-cycles. To find new lead compounds in drug research, extensive collections of molecules are required to be mined for new medicines. The researchers of the University of Basel have completed a total synthesis of more than one million macrocycles that incorporate structural elements often observed in natural biologically active macrocycles.
http://swissinnovation.org/news/web/2019/03-190611-56

Funding to Examine Ubiquitin Cascades

(University of Lugano, June 11, 2019)

Various chemical modifications regulate the activities of proteins in cells. One common modification is the attachment of ubiquitin molecules through a cascade of enzymes. However, genetic defects in the ubiquitin cascades are the cause for various hereditary as well as acquired diseases, such as tumors, immune disorders or neurodegenerative

diseases. Research in this field is still in its infancy as the biology and transient nature of ubiquitin modifications are highly complex. A scientist at University of Lugano has now received 2.5 US$ million funding from the Swiss National Science Foundation to conduct a multidisciplinary project to fill this knowledge gap. The goal of this venture is to develop and optimize methods and chemical substances to detect and influence changes within ubiquitin cascades in regard to cancer. The team will use biochemical approaches, cell-culture models and visualization techniques.
http://swissinnovation.org/news/web/2019/03-190611-1c

Speed Determinants in Protein Production

(University of Basel, July 12, 2019)

Among many other things, proteins catalyze biochemical reactions, relay signals and are required for building cellular structures and transport processes. In each and every cell of the human body, there are vast quantities of proteins being produced constantly. The production of proteins, or protein synthesis, requires three main players: the mRNA that carries the gene's message and works as a template; the tRNA brings the protein building blocks, the amino acids, to the ribosome; and the ribosome that chains the amino acids into the protein sequence. A research team of the University of Basel has uncovered important factors that influence the speed of protein synthesis in the cell. They found that whether an amino acid is charged positively or negatively has an influence on the speed, where the former reduces the speech with which ribosomes proceed on the corresponding mRNAs. The scientists now want to further investigate this.
http://swissinnovation.org/news/web/2019/08-190712-de

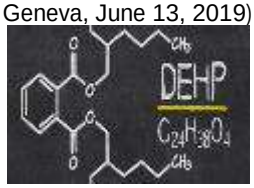
How Practicing Fine Motor Coordination Changes the Brain

(University of Basel, June 12, 2019)

A research group at the Biozentrum, University of Basel, has investigated the red nucleus, a region of the midbrain that controls fine motor movement, and identified a new population of nerve cells which changes when fine motor coordination is trained. They have also shown how fine motor tasks promote plastic reorganization of this brain region. The results of the study have been published recently in Nature Communications. In a further step, the team wants to investigate the stability of these strengthened nerve cell connections and find out to what extent they regress when the learned fine motor movements are not practiced. The findings could also provide new insights into the understanding of Parkinson's disease.
http://swissinnovation.org/news/web/2019/03-190612-a7

Genetic Inequity Towards Endocrine Disruptors

(University of Geneva, June 13, 2019)



Phthalates, one of the most common endocrine disruptors, are commonly used by industry in many plastic products – toys, clothing, baby bottles or even medical equipment – as well as in cosmetics. The exposure of male fetuses to phthalates can have devastating consequences for the fertility of future individuals by modifying the regulatory elements of the expression of genes responsible for spermatogenesis. However, we are not all equal: researchers at the University of Geneva (UNIGE) and the University Hospitals of Geneva (HUG), Switzerland, show that phthalate susceptibility depends largely on the genetic heritage of each individual. These results raise the question of individual vulnerability as well as that of the possible transmission to future generations of epigenetic changes that should normally be erased during fetal development.
http://swissinnovation.org/news/web/2019/03-190613-22

Anti-Aging Compound with Promising Results

(EPFL, June 14, 2019)

After reaching the age of 50, the human body starts losing skeletal muscle strength and mass. Researchers of two EPFL spin-offs have recently found that the so-called Urolithin A (UA) helps in slowing down certain processes. Urolithin A is a metabolite of biomolecules found in certain fruit such as pomegranates, which improves the functioning of mitochondria and thus decelerates the loss of skeletal muscle mass. The team conducted a one-month clinical trial in which elderly patients got a synthesized compound of UA and the team checked for negative effects. Even after a prolonged period of time they found no adverse effects. They also controlled for efficacy by looking at the cellular and mitochondrial health biomarkers in patient's blood and muscles and found that the compound increased mitochondrial mass just like regular exercise does. This confirmed the theory of the slowing effect. The next step is to commercialize a product.
http://swissinnovation.org/news/web/2019/03-190614-33

Adolescence Is Crucial in Schizophrenia Development

(University of Geneva, June 17, 2019)

Schizophrenia is a psychiatric illness that affects 0.5% of the population and causes hallucinations as well as memory and cognition problems. The illness may be related to abnormalities of chromosome 22, which is referred to as deletion syndrome, but not everyone with the syndrome develops schizophrenia. Only around 30% of affected people develop psychotic symptoms specific to schizophrenia. Researchers at the University of Geneva have examined what triggers the illness and provided an initial answer to it. They found that people who have the deletion syndrome have a smaller hippocampus than people who don't have the syndrome, however, the development curve is the same. As soon as the first psychotic symptoms appear, which is usually in adolescence, the hippocampus impoverishes dramatically. The long-term study which followed 275 patients over 18 years could provide important insights which will lead to a better understanding of schizophrenia.
http://swissinnovation.org/news/web/2019/03-190617-f0

Rinsing System in Stomach Protects Ruminants' Teeth

(University of Zurich, June 17, 2019)

When grazing, goats, sheep and cows often ingest earth that can damage their teeth. Researchers from the University of Zurich have shown how animals protect themselves against dental abrasion. Ruminant stomachs have multiple chambers – rumen, reticulum, omasum and abomasum – which use bacteria to digest plant material. Food is washed by rumen fluid and sorted into material that is small enough to digest, and larger pieces that are regurgitated to be chewed again. Using computer tomography, the researchers observed that ingested sand first sinks down in the rumen and collects in the abomasum, passes through the bowel and is then expelled with undigested material in the feces. Ruminants' stomach systems thus rinse dust and sand off ingested food before it is rechewed, helping ensure the animals' survival.
http://swissinnovation.org/news/web/2019/03-190617-30

Redundancies in Immune Cells Could Advance Cancer Immunotherapy

(ETH Zurich, June 18, 2019)

Oncologists have had great success with cancer immunotherapy in recent years, especially with the approach known as immune checkpoint inhibition, which was recognized with last year's Nobel prize for medicine. Tumor cells have the ability to curb the activity of patients' own T cells, causing the T cells to leave the tumor alone. To do this, they use a molecular "handshake", where molecules on the surface of tumor cells interact with checkpoint molecules, as they are known, on the surface of T cells. One of the key checkpoint

molecules is PD-1. Until now, there had been little research into just how the PD-1 handshake signal is transmitted within T cells to prevent the cells being activated. A team of scientists at ETH Zurich and Aix-Marseille University has now taken a closer look at important molecules in the biochemical signaling pathway of PD-1, including the enzyme SHP-2. Cancer researchers are targeting this enzyme to further increase the efficacy of cancer immunotherapy. The scientists in Zurich and Marseille have now shown that when SHP-2 is lacking, a related molecule, SHP-1, performs its role.
http://swissinnovation.org/news/web/2019/03-190618-be

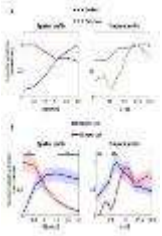
Designer Virus to Trigger Stress

(ETH Zurich, June 21, 2019)

Electrical pulses are nowadays already used for the treatment of certain diseases such as Parkinson's disease. Researchers at ETH Zurich are now examining the consequences of stress by using brain stimulation. Chronic and acute stress affects the organism and can lead to mental disorders. However, dismantling stress responses is extremely difficult and complex as stress not only affects the brain but the body in general. The researchers are, therefore, focusing and individual elements like the noradrenergic system, which plays a crucial role in stress development. They use designer viruses to modify the activity of neurons in the area of interest, allowing them to trigger the release of norepinephrine without having to trigger the whole stress system. The ultimate goal is to discover new therapy methods for the treatment of stress-related psychiatric diseases.
http://swissinnovation.org/news/web/2019/03-190621-8e

How the Brain Processes Sound and Voice

(University of Geneva, June 21, 2019)



Whether the brain is able to differentiate between a voice and the specific sounds it utters was the question some researchers asked. The team, including scientists from the University of Geneva and the University of Maastricht, devised pseudo words - words that have no meaning - spoken by three different voices and pitches. The data they retrieved was checked in order to observe how the brain processes information when it either focuses on the voice or on the phonemes, the speech sound. The team discovered that the auditory cortex amplifies differing aspects of the sound depending on what task is performed. To differentiate between voices, voice specific information is prioritized, whereas phoneme-specific information is retrieved to differentiate between speech sounds. The research sheds light on the cerebral mechanisms involved in speech processing.
http://swissinnovation.org/news/web/2019/03-190621-79

Device Detects Haemostasis Problems in One Hour

(University of Geneva, June 21, 2019)

If the human haemostatic system is dysfunctional, the result can be serious bleeding or a thrombosis. In very extreme cases, both occurrences can end in death. Researchers from France and the University of Geneva have now developed a device, which enables to study a patient's platelet capacity - this is the patient's capacity to plug holes in the damaged blood vessels. BlooDe, as the device is called, can detect deficient platelet-related haemostasis of a patient before an invasive operation. In less than an hour, BlooDe creates artificial blood circulation in near real-life conditions by only using some milliliters of blood. The prototype has successfully passed its first laboratory test and the researchers are currently working on improving the device in order to plan larger-scale production and commercialization.
http://swissinnovation.org/news/web/2019/03-190621-62

Novel Therapy for Treatment After Stroke

(University of Zurich, June 24, 2019)

Every year, roughly 16,000 people in Switzerland suffer a stoke. Two thirds of the affected patients die or are in need of permanent care. Researchers at the University of Zurich have conducted research into this field and recently published a pathbreaking study. After a stroke, certain antibodies can aid in repairing blood vessels in the affected brain regions, which also helps in regaining motor functions. When the signaling molecule Nogo-A is inhibited, vascular growth around the affected brain region is promoted and with that the capacity to regenerate damaged tissue and neural circuits. The research group has now conducted mouse trials with anti-Nogo-A antibodies and first results show that mice treated with it show better recovery. The Nogo-A antibodies are currently in clinical tests for treatment of spinal cord injuries and provide a promising alternative approach to treating stroke patients.
http://swissinnovation.org/news/web/2019/03-190624-0c

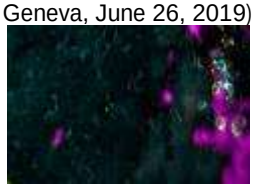
Evolution of the Frilled Dragon's Frill

(University of Geneva, June 25, 2019)

The frilled dragon, a lizard living in Australia and New Guinea, has a large disc of skin around its neck. This frill is normally folded back but can be erected in a spectacular fashion to scare off predators and competitors. This frill has been subject to a study by researchers at the University of Geneva and the SIB Swiss Institute of Bioinformatics. They found that an ancestral embryonic gill of the dragon embryo develops into a neck pocked which then expands and folds, forming the frill. The robust folding pattern emerges from mechanical forces during the homogeneous growth of the frill skin, due to the tensions resulting from its attachment to the neck and head. The findings provide evidence that physical processes as well as genetic programs can shape tissues and organs during embryonic development.
http://swissinnovation.org/news/web/2019/03-190625-b8

Childhood Infections Might Trigger Multiple Sclerosis

(University of Geneva, June 26, 2019)



Multiple Sclerosis (MS) is an auto-immune disease of the central nervous system and the most common auto-immune disease. In Switzerland, one in 1,000 people is affected, two thirds of which are women. Until today, it is not understood what factors trigger the disease which often starts at around 30 years of age, neither are there any cures available. Researchers of the University of Geneva and the University Hospital of Geneva have conducted research into a possible link between MS and early childhood viral infections in the brain. They found that such transient infections leave a local footprint in the brain. This local, cerebral change can later trigger the immune system to turn against itself at this location, setting off autoimmune lesions. Having found some initial results, the team now is continuing to investigate this and hopes to better understand the possible causes in the future.
http://swissinnovation.org/news/web/2019/03-190626-1b

Semi-Permeable Gel for Diabetes Treatment

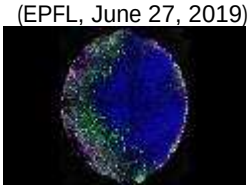
(EPFL, June 27, 2019)

When tissue is transplanted into a body, the immune system often attacks it, making survival in the host system difficult. The result is a shortage of suitable transplant for patients with dysfunctional cells and organs, which forced researchers to find new solutions. One idea that came up was to coat the human cell with a semi-permeable gel in order to protect the tissue from being attacked by the host, implying a transplant can be conducted without giving immunosuppressive drugs to the patient. A team at EPFL has recently managed to develop this technology for the treatment of type 1 diabetes. The semi-permeable gel acts as selective filter

which blocks immune-system cells and antibodies while allowing oxygen and other molecules to pass through. The gel has now been licensed to the Geneva-based startup Cell-Caps SA, which works closely with a diabetes research foundation.
http://swissinnovation.org/news/web/2019/03-190627-52

Human Embryonic Stem Cells on a Chip

(EPFL, June 27, 2019)



Using human embryos for biological and medical research comes with many ethical concerns. However correct it is to proceed with caution in these matters, science would only benefit from being able to study human biology more accurately. One solution lies with in vitro models. Researchers at EPFL have developed such an in vitro method based on microfluidics to stimulate human stem cells to organize themselves into ordered layers of different cell types. Published in Nature Methods, the method can help better understand how tissues are formed in the embryo, setting the stage for fabricating functional tissues and organs for drug testing and transplantation.
http://swissinnovation.org/news/web/2019/03-190627-eb

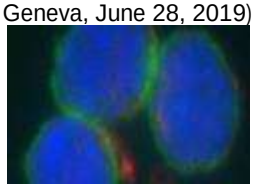
Early Detection for Heart Attacks

(University of Basel, June 28, 2019)

Pain in the chest is an indicator of a heart attack and one of the most frequently mentioned reasons why people visit the emergency unit. However, this is not a very reliable indicator. A novel test method has proven to provide a fast and reliable diagnosis for heart attacks. To do it, the troponin concentration in the patient's blood is being analyzed. Troponin is a heart-specific protein, which enters the blood stream if the heart muscle cells have been damaged, however, an increased troponin concentration can be due to other causes, too. At the University of Basel, researchers found another indicator, namely the change of the troponin level within a 1-3 hour. This analysis has proven to be a good indicator, also to asses individual heart attack risks of patients. The scientists will now develop an online risk calculator with the data they assembled from the study.
http://swissinnovation.org/news/web/2019/03-190628-82

Gold's Medical Applications

(University of Geneva, June 28, 2019)



In medicine, nanoparticles are used for preventive and therapeutic vaccines as they form a protective vehicle for drugs to specifically target the places where they are most effective while sparing other cells. This reduces side effects and allows to decrease the dosage of the medication. For this particular purpose and nanomedicine in general, gold is an ideal candidate. It has, for example, physico-chemical properties, is well tolerated by the body, easily malleable, can absorb light and then release heat, which is a property that can be exploited in oncology. Researchers at the University of Geneva have tested a variety of gold nanoparticles. They provided first evidence of their impact upon the immune cells responsible for antibody production, so-called B lymphocytes. Gold nanoparticles could additionally be made small enough to pass the blood-brain barrier, which allows for specific anti-tumoral drug therapies.
http://swissinnovation.org/news/web/2019/03-190628-71

Cruelty-Free: Chicken Eggs Instead of Mice Embryos

(University of Basel, July 02, 2019)

The 3R Competence Center (3RCC) Switzerland, an initiative of higher educational institutions, industry as well as regulatory authorities as well as animal protection groups, has awarded 1.2 US$ million in funding for cruelty-free projects. One of the projects is initiated by a researcher at the University of Basel. The research team is trying to decode the molecular mechanisms of cell type specification in order to produce certain cell types in vitro. These kinds of processes can only be understood properly by examining an embryo that is developing and, therefore, the deployment of non-human model organisms is necessary. Instead of using mice embryos, which requires to kill the mother animals, chicken eggs could be used instead. This not only prevents the killing of mice but could also maximize the information content of the experiments, which again can enhance the understanding of human cell development.
http://swissinnovation.org/news/web/2019/03-190702-20

Free-Access Map of Hepatitis E High Risk Areas

(EPFL, July 11, 2019)

Scientists from EPFL have created the first world map of regions with the highest prevalence of the hepatitis E virus (HEV) - and it is freely accessible online. The team has high hopes that the map will induce governments, policy makers and NGOs to design more effective prevention campaigns based on it. In many regions, the main culprit why people catch HEV, which is generally not fatal, is eating undercooked pork. In some less developed countries, however, contact with water that is contaminated with fecal matter is a main reason for triggering the disease. The spread usually increases after floods or months-long droughts. By collecting data on all recorded HEV epidemics around the globe since 1980 as well as environmental statistics, the researchers compiled the map. It is only one step towards developing prevention campaigns in high-risk areas.
http://swissinnovation.org/news/web/2019/03-190711-7d

Leukemia Cells Deactivate Danger Detector

(University of Basel, July 17, 2019)

Patients treated for acute myeloid leukemia (AML) often achieve remission but then later experience relapses due to surviving subpopulations of leukemia stem cells. A research team where the University of Basel was part of found that acute myeloid leukemia stem cells elude the body's immune cells by deactivating a danger detector. The underlying mechanisms gives rise to potential new therapeutic approaches. The effectiveness of immunotherapies could therefore be improved if they were used in combination with treatments that sensitize cancer stem cells to immunological attack.
http://swissinnovation.org/news/web/2019/03-190717-b9

Immune Cells That Could Cause Multiple Sclerosis

(University of Zurich, July 22, 2019)

Multiple Sclerosis (MS) is a chronic autoimmune disease of the central nervous system and the most common autoimmune disease. In Switzerland, one in 1,000 persons is affected, two thirds of which are women. Researchers of the University of Zurich have now been able to identify a cell population - so-called T helper cells - in the blood of MS patients. They seem to infiltrate the central nervous system, can cause inflammation there and damage nerve cells. The researchers used high-dimensional cytometry to characterize the immune cells. This technology makes it possible to analyze millions of cells in hundreds of patients and determine their immune properties. It was found that the cell population has two key properties that are characteristic to MS, however, claiming a disease-causing role would be rushed, according to the researchers. Further studies will have to provide proof for the hypothesis.
http://swissinnovation.org/news/web/2019/03-190722-39

Silicone-Printed Heart Valves

(ETH Zurich, July 23, 2019)

The human heart has four chambers. If any of the heart valves are leaking, narrowed or distended, this can lead to arrhythmia or even heart failure. Depending on the severity of the defect, artificial heart valves can be inserted to remedy the problem. It is expected that this type of surgery will soar over the next decade due to ageing populations and lack of physical exercise. Researchers at ETH Zurich in partnership with South African scientists are using 3D printing to produce custom-made artificial heart valves from silicone. The new model has several advantages over conventional heart valves: the silicone heart valve can be tailored more precisely to the patient, as the researchers first determine the individual shape and size of the leaky heart valve using computer tomography or magnetic resonance imaging. Now the team is contemplating finding an industrial partner or founding a spin-off to commercialize.
http://swissinnovation.org/news/web/2019/03-190723-f3

4. Nano / Micro Technology / Material Science

Testing the Stability of Perovskite Solar Cells

(EPFL, June 21, 2019)

Perovskite solar cells are almost as efficient as the best conventional silicon ones, and there is much hope that they will become a highly efficient and low-cost alternative, as they can be manufactured by rather simple and fast methods like printing. The major obstacle for commercialization, however, is the stability of perovskite devices. Researchers at EPFL have brought diurnal and seasonal variations into the lab to test the performance of perovskite solar cells under realistic conditions. They have found that temperature and irradiance variations does not affect the performance of perovskite solar cells in any dramatic way, and although the efficiency of the cells decreases slightly during the course of a day, it recovers during the night.
http://swissinnovation.org/news/web/2019/04-190621-86

Graphene as High-Performance Carbon Capture

(EPFL, July 26, 2019)

CO2 produced from burning fossil fuels is a main greenhouse gas and thus a major burden of global warming. A carbon capture is one way of decreasing the burden and it functions by preventing CO2 from entering the atmosphere. Carbon capture can be done using so-called "high-performance membranes", which are polymer filters that can specifically pick out CO2 from a mix of gases, such as those coming out of a factory's flue. Scientists at EPFL have now developed a new class of high-performance membranes that exceeds post-combustion capture targets by a significant margin. The membranes are based on single-layer-graphene with a selective layer thinner than 20 nm and are highly tunable in terms of chemistry. They can pave the way for next-generation high-performance membranes for several critical separations.
http://swissinnovation.org/news/web/2019/04-190726-63

Digitizing All Materials in the World

(EPFL, July 29, 2019)

A team of EPFL scientists set themselves the goal of building the largest digital database of materials in the world. They plan on digitally replicate the visual appearance of all natural and synthetic materials. They gather every material they can find and use a gonio-photometer, which is a sophisticated machine that measures the light reflected by a material at different angles. The data gathered is much richer than a single

photograph and it can be used to generate photorealistic computer images of objects made from those same materials within arbitrary virtual scenes. Such data is invaluable in areas such as architecture, computer vision or the entertainment industry. The lab has started to work with Weta Digital and Industrial Light & Magic that have produced movies such as Avatar and Star Wars.
http://swissinnovation.org/news/web/2019/04-190729-44

Changed Atomic Structure Leads to Improved Thermal Activity

(University of Basel, July 19, 2019)

In electronic devices such as computers and cellphones, materials and parts are constantly being scaled down. In relation with this downsizing of parts, understanding the thermal conductivity of materials is a crucial challenge of nano-sciences. Not only that, research is additionally investing in developing materials that allow for a targeted control over phonons - mechanical waves responsible for heat development. A multinational team with the participation of the University of Basel has conducted research and found that solely the arrangement of atoms has an influence on phonons and thus on thermal conductivity. Formerly, superstructures made of periodically arranged layers of different materials lost a high amount of conductivity as interfaces between differing materials were often not clearly defined. The present study showed that no disruptive effects occur when the layers consist of an identical material for which the arrangement of atoms differs.
http://swissinnovation.org/news/web/2019/06-190719-ef

New Method to Detect Forged Paintings

(ETH Zurich, June 03, 2019)

Forged paintings are easily detected if it can be established that the materials used are more recent than the date of the painting. Unfortunately, in case of the standardly used radiocarbon dating, the sample may be falsified by the use of old materials. That is why, in an attempt to conceal the fake more effectively, modern forgers often use old materials or opt to paint over older artworks. Researchers at ETH have now come up with a new method, combining the well-known physical method with chemical ones to obtain a clear result. The new process is likely to attract a great deal of interest in the art world, as it has the potential of validating the authenticity of famous paintings.
http://swissinnovation.org/news/web/2019/10-190603-26

5. Information & Communications Technology

Using Deep Learning to Digitize Music Sheets Doubles Accuracy

(ZHAW, June 05, 2019)

Researchers from the ZHAW have developed a new method for the optical music recognition (OMR) specialized on music sheets. The new method has more than double the accuracy for digitizing music sheets than it was previously possible. The researchers used the Deep Watershed Detector method, and a data set containing around 300 000 pages of fully annotated music sheets to train the AI. The resulting model is now available in an app which can be used to digitize music sheets.
http://swissinnovation.org/news/web/2019/05-190605-c3

Decoding Beethoven's Music Style Using Data Science

(EPFL, June 06, 2019)

EPFL researchers are investigating what makes Beethoven's music unique. They have completed a first analysis of Beethoven's composition style, applying statistical techniques to unlock the recurring patterns that characterize musical structures in the Beethoven String Quartets – 16 quartets (by two violins, the viola and the cello) encompassing 70 single movements that Beethoven composed throughout his lifetime. Thanks to the new data set generated by the researchers, Beethoven's creative choices are now apparent. The statistical methodology characterizes Beethoven's specific composition style for the String Quartets, through a distribution of all the chords he used, how often they occur, and how they transition from one to another. The results are published in PLOS ONE. The researchers are extending their research to a broad range of composers and historical periods.
http://swissinnovation.org/news/web/2019/05-190606-5a

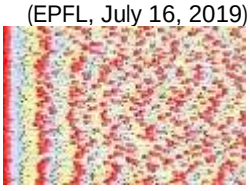
Inaudible Data Transfer Through Music

(ETH Zurich, July 09, 2019)

Two doctoral students and a Master's student at ETH Zurich have developed a method to transfer data through music from a loudspeaker to a smartphone microphone. The data transfer is imperceptible to the human ear, therefore does not affect listening pleasure. Contrary to former approaches, the scientists use the dominant notes of a piece of music and overlay each with two marginally lower and two marginally higher notes, which all are less audible. The data is carried in these additional notes and covered by the dominant notes. Currently, around 200 bits of data, corresponding to 25 letters, per second can be transferred. The technique could have interesting applications in museum, hotels or department stores where for instance the Wi-Fi password could be transmitted through the music and users would not need to insert the password manually.
http://swissinnovation.org/news/web/2019/05-190709-3e

Analyzing Fertility Apps' Data

(EPFL, July 16, 2019)



The use of a fertility awareness (FAM) method app can help in tracking menstrual cycles and other indicators of fertility. The question a researcher at EPFL asked herself is how accurate such apps are. She led a large-scale study on 200,000 users of two FAM apps, Sympto and Kindara. The scientists tracked more than 30 million days of observations from over 2.7 million menstrual cycles. Regarding demographics, the study found that typical FAM app users are around 30 years old, lives in a western country and have healthy BMIs. It was also found that the average duration and range of the follicular phase, which begins the menstrual cycle and ends at ovulation, were larger than previously reported. This can help to better understand menstrual health and female health, which historically has been understudied.
http://swissinnovation.org/news/web/2019/05-190716-91

6. Energy / Environment

Floating Solar Islands

(Empa, June 04, 2019)

Researchers from ETH Zurich, PSI and the Universities of Zurich, Bern and the Norwegian University of Science and Technology, together with a team from Empa, have shown that solar methanol islands could produce enough fuel in the long term to make all carbon dioxide emitted from transportation sources neutral - worldwide. In the middle of the oceans, hydrogen is to be produced from solar energy and water, which is then converted into methanol on site using carbon dioxide extracted from the seawater. To this end, the researchers analyzed in detail a scenario that still seems purely hypothetical, but already provides the basis for a possible implementation.
http://swissinnovation.org/news/web/2019/06-190604-e8

Stressor Synergies Threaten Honeybees

(University of Bern, June 04, 2019)

The Western honeybee is the most important managed pollinator worldwide, however, it has recently experienced unsustainably high colony losses in many regions. An international team of researchers under the lead of University of Bern and Agroscope has analyzed data and found previously overlooked mechanisms that might be responsible for these losses. There seem to be synergistic interactions among two stressors, namely the parasitic mite Varroa destructor and neonicotinoid insecticides, and they have a negative impact on the honeybees. The synergistic effect was so far overseen as it is time-lagged. If the honeybees were only affected by the neonicotinoids via pollen paste feeding, no negative effects were found. In combination with mite infestation, body mass and longevity. This study stresses the importance of developing sustainable agro-ecosystem management schemes which reduce the use of neonicotinoids.
http://swissinnovation.org/news/web/2019/06-190604-bb

Soils and Landscapes

(EPFL, June 05, 2019)

A researcher at EPFL has just published a book about the soils of Switzerland and Europe. The book reminds readers of the essential role soils play in the ecosystem and the potential for innovation they contain. It summarizes recent scientific research and will be of interest to pedologists, biologists, geographers, forestry specialists, town planners and nature-lovers alike. It emphases that each soil type can fulfill different functions depending on its composition. Switzerland's Federal Office for the Environment recognizes several functions, but currently, the only value estimated with respect to a plot of land is its monetary value as a real-estate asset. The value of the soil resulting from its other functions has yet to be established.
http://swissinnovation.org/news/web/2019/06-190605-dd

Extreme Heat to Impact One Third of the African Urban Population

(University of Geneva, June 05, 2019)

Climate change, population growth and urbanization are increasing people's exposure to extreme temperatures, especially in the tropics. For the first time, researchers at the University of Geneva – in collaboration with the University of Twente (Netherlands) and the EU Joint Research Centre in Ispra (Italy) – have assessed various possible scenarios regarding the rate of climate change and socio-economic development in 173 African cities for the years 2030, 2060 and 2090. Their results, published in Earth's Future, show that a third of African city-dwellers could be affected by deadly heat waves in 2090. The projections also highlight the influence of

socio-economic development and indicate that exposure could be curbed by, e.g., restricting urbanization, improving the quality of life in rural areas or promoting the development of modest-sized cities.
http://swissinnovation.org/news/web/2019/06-190605-75

Highly Efficient PET-Recycling Method

(EPFL, July 18, 2019)

Even though there are ways to recycle PET, strong limitations come with them. None of the methods currently deployed achieves to recycle the entire plastic bottle, small parts always must be new. Additionally, many PET containers contain contaminants and additives such as dyes, which make them unfit for being recycled, hence they are incinerated. An EPFL startup called DePoly has now come up with an innovative technique to recycle PET. For this novel method it does not matter what content was in the container, they do not need to be sorted. Also, the method works with fabrics like polyester and can break it down into cotton and PET fibers. The startup has already won prices for their innovation and are currently conducting tests on an industrial scale in the hope to commercialize the method.
http://swissinnovation.org/news/web/2019/11-190718-c4

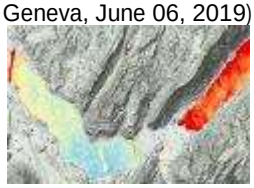
Bacterial Biofilms and High Flow Rates

(EPFL, June 06, 2019)

Bacteria are - contrary to popular perception - very social organisms. Looking at bacterial biofilms and how they are affected by fluid flows, researchers at EPFL have learned about physical rules of biofilm architecture as well as social dynamics of bacteria. With about 90% of all bacterial life in this form, biofilms are the preferred lifestyle of bacteria which allows them to build new, social dynamics among their member microorganisms whilst also defending them. Many things regarding the organization of the cells are still unclear, for example how they mix or segregate. The researchers also examined how they are affected by the flow of fluid around them. Some of these results were rather counter-intuitive. It was for example found that high flow rates lower the probability of swimming bacteria to invade existing colonies. According to the researchers, there is still much to learn.
http://swissinnovation.org/news/web/2019/06-190606-e2

National Satellite Data for Natural Resource Management

(University of Geneva, June 06, 2019)



Natural resources are under pressure due to population growth, urbanization and the advancement of infrastructure in Switzerland. Climate change will additionally be a negative externality on top of that. In order to achieve the best possible land management given how small the country is, four institutions are planning on continuously monitoring the country from space. The Swiss Data Cube is an innovative technology that assembles all available satellite images, and which will allow to receive data for environmental monitoring at national scale. The involved institutions are the universities of Geneva and Zurich, UNEP/GRID-Geneva and the Swiss Federal Institute for Forest, Snow and Landscape Research. Gaining data on climate, vegetation, forests, water quality and urbanization should enable policy makers and authorities to give more effective responses to problems of national significance.
http://swissinnovation.org/news/web/2019/06-190606-2f

Using Software to Protect the World's Most Endangered Species

(EPFL, June 20, 2019)

By combining genetic and environmental databases, researchers at EPFL are seeking to help biologists identify more accurately the animal and plant species most exposed to climate change, in order to develop appropriate conservation methods. The software works by providing biologists with simultaneous and direct access to bioinformatics databases featuring automatic genome annotations and to climate databases. This combined functionality can save weeks of work. Climate databases contain information about precipitation, wind, sunlight and cloud cover in a given region. The software, named R.Samada, assesses the relationship between the genetic and environmental information and generates graphs and maps that allow researchers to visualize the data rapidly.
http://swissinnovation.org/news/web/2019/05-190620-57

Carbon-Neutral Fuel Only Using Sunlight and Air

(ETH Zurich, June 13, 2019)

With the climate agreements and environmental concerns increasing, carbon-neutral fuels are of high importance. They would make aviation and maritime transport systems more sustainable. Researchers of ETH Zurich have recently come up with a new method that produces liquid hydrocarbon fuels only with the help of sunlight and air. This is globally the first time that the entire thermochemical process chain has been demonstrated under real field conditions. The ETH-developed solar plant produces synthetic liquid fuels that release the same amount of CO2 that was previously extracted from the air for their production. The method extracts CO2 and water directly from the air and splits them with the aid of solar energy. The result is a mixture of hydrogen and carbon monoxide, which can be processed into kerosene or methanol. The next goal is to scale the technology for industries and make it economically competitive.
http://swissinnovation.org/news/web/2019/06-190613-19

Effects of Neurotoxins on Fish are More Complex than Expected

(Eawag, June 13, 2019)

The insecticide imidacloprid is one of the strongest insect toxins and belongs to the group of neonicotinoids. Since 2019, the use of imidacloprid, along with two other substances in this group, is only allowed in greenhouses, as this substance is one of those responsible for the death of bees. Imidacloprid is also very toxic for aquatic organisms. The effects on fish have been investigated by a group of researchers at Eawag and were found to be much more complex than simply neurotoxic. The fish also suffered deformations, stunted growth and pathological tissue changes. An explanation as to why the neurotoxin has such an effect on the development of fish is not yet known.
http://swissinnovation.org/news/web/2019/06-190613-d1

Switzerland's Energy Future and Power-to-X

(The Federal Council, July 03, 2019)

Switzerland has set itself the goal of drastically reducing its direct emissions of greenhouse gases. For instance by 2050, Switzerland targets to have a climate-neutral energy supply. A joint research between five Swiss competence centers for energy research prepared a white paper on Power-to-X" for consideration by the Swiss Federal Energy Research Commission. The researchers amassed extensive information on various aspects of Power-to-X technologies, including their potential to contribute to Energy Strategy 2050, what challenges each technology faces, and what key factors could promote their widespread use. Power-to-X techniques are of interest because new sources of renewable energy from photovoltaics or wind power are not available continuously, but rather with fluctuating intensity. The aim of the paper is to suggest some

improvements regarding energy strategy by different technologies based on conversion and storage of various forms of energy
http://swissinnovation.org/news/web/2019/06-190703-cf

Analyzing Ice to Look into the Past

(Paul Scherrer Institut, June 13, 2019)

In order to answer questions about climate change and reduce air pollution, researchers of the Paul Scherrer Institut drill through millennia-old glaciers. The researchers tour to different high-altitude glaciers all around the world and extract drill cores from the ice. Analyzing the ice allows to gain a glimpse into the past as glaciers act as a natural archive. They got a 160-meter drill core and expect to be able to look back roughly 10'000 years by using radiocarbon dating to measure organic particulates that are present in the core. Not only does the ice provide climate information but it gives further historical insights. For example, in a Siberian glacier pollution through silver mining was detected which can be dated back to the time when Catherine the Great ruled Russia. The silver back then was used to make coins. Many further aspects can be studies through the ice.
http://swissinnovation.org/news/web/2019/06-190613-07

Lifestyle Changes in Households Help with Climate

(University of Geneva, June 19, 2019)

In order to achieve a normalization of the climate, a profound rethinking of our habits as well as an energy transition is needed. Researchers at University of Geneva investigated what contribution households could make to curb the climate crisis. They carried out experiments to lower the energy consumption of 300 households in 8 countries. Lowering the room temperature to 18°C and cut the amount of washing cycles in half over a month, indicated that up to 6% less energy was consumed. Additionally, 13 million cubic meters of water could be saved along with one hour spent on household chores. Achieving these results came with no significant impact on comfort levels of people. The objectives of the 2050 Energy Strategy which were decided by the parliament in 2017 aim at a 13% reduction in energy consumption per person in 2035 as compared to the year 2000.
http://swissinnovation.org/news/web/2019/06-190619-54

Local and Clean Energy for the Future

(ETH Zurich, June 22, 2019)

At the end of last year, an experiment started in Switzerland allowing a neighborhood to trade solar energy through a peer-to-peer platform. The experiment, which runs under the name Quartierstrom, is tentatively investigating how energy might be traded in the future. 37 households are part of the trial in which owners of photovoltaic systems can sell their electricity surplus to their neighbors. In this way, they avoid going through retail energy suppliers from outside the community and have the opportunity to purchase clean, locally produced energy. 28 of the participants have their own photovoltaic systems and nine are pure consumers. The goal is to investigate and understand how energy markets could work in the future. It is hoped that a shift away from centralized power plants towards smaller and private producers will take place.
http://swissinnovation.org/news/web/2019/06-190622-35

Sediment Data Shows Financial Crisis

(University of Geneva, July 02, 2019)

Water moves and carries sediments which settle down in rivers, lakes and seas. For flood prevention, hydropower production and ecosystems, this sedimentation plays a crucial role. Until a team of University of Geneva started researching, it was not known how climate change affects sedimentation. The study provides the first comprehensive knowledge of how sedimentation in Lake Geneva has developed since the 1960s. It shows that in the 1980s a shift occurred in terms of sedimentation rates: They started to grow and more than doubled ever since. Even though, hydropower was expected to decrease the accumulation rate, this isn't completely the case as particulate matter still travels downstream. Interestingly, it was found that the financial crisis in 2008 had an influence. Specifically, construction was reduced during this time and more sediment reached Lake Geneva. The results could provide indications on flood prevention.
http://swissinnovation.org/news/web/2019/06-190702-93

Porcini Mushrooms' Altitude Record

(ETH Zurich, July 02, 2019)

Researchers at ETH Zurich have recently discovered an altitude record for porcini mushrooms by coincidence. The fungi grew at over 2,400 meters in the Lower Engadine, which is the highest altitude ever recorded for edible mushrooms. Until this point, the highest altitude for porcini mushrooms was 2.200 meters. Of additional interest was that the fungi had formed a symbiosis with a plant that was formerly not known as a host. In order to find out more about the switch of hosts as well as the venture into this altitude, the DNA will be examined. The goal is to find out whether the DNA is altered as compared to other porcini fungi and how closely different populations are related to each other.
http://swissinnovation.org/news/web/2019/06-190702-a9

AI Heat Pumps Save Energy

(EPFL, July 03, 2019)

Roughly 60% of all Swiss households are equipped with heat pumps that draw thermal energy from the surroundings and transforms it into heat. Such heat pumps are generally environmentally friendly, however, there is still significant room for improvement, for example by using micro-turbocompressors. Researchers at EPFL focused exactly on improving this environmental friendliness of the pumps by using a machine-learning process to calculate the ideal size for the turbocompressor depending on the heat pump. Their approach is not only 1,500 times faster than the conventionally used charts but also lets engineers skip some steps in the design process. This research paves the way for microturbocompressors to be more widely used and boost pumps' heat transfer coefficients by up to 30%.
http://swissinnovation.org/news/web/2019/06-190703-0f

Stones' Reactivity Contributed to Global Cooling

(ETH Zurich, July 03, 2019)

The climate of our planet entered a period of slow, continuous cooling around 15 million years ago, and at the same time the Antarctic ice sheet grew steadily larger. Finally, around 2.5 million years ago, Greenland became covered in ice, thrusting the Earth into its current bipolar ice age. Scientists have wondered about the causes for this cooling for a long time and a group of ETH Zurich scientists have now examined this phenomenon. By using model and previously published data, they discovered that weathering was constant during this period. However, reactivity - the willingness of a chemical bond or element to react - of the land surface increased during this time causing a continuous and decisive reduction in atmospheric CO2 and thus a global cooling. The scientists suggest that their hypothesis should trigger a geological rethinking.
http://swissinnovation.org/news/web/2019/06-190703-c6

Forestation to Significantly Improve Climate

(ETH Zurich, July 04, 2019)

The Crowther Lab at ETH Zurich recently analyzed how much land worldwide could be suitable for reforestation in order to combat climate change. In a recently published study, they state that roughly 0.9 billion hectares of land could be used to plant trees, which corresponds to the area of the US. The earth could support 4.4 billion hectares of continuous tree cover, which is 1.6 billion hectares more than the current 2.8 billion. However, even on the 0.9-billion-hectare area, once the forests are mature, they would be able to store 205 billion tonnes of carbon. This is about two thirds of the 300 billion tonnes of human-induced carbon that has been released into the atmosphere since the Industrial Revolution. It was known that forests play a major role in restoring the climate but before it was not known how significant this role is.
http://swissinnovation.org/news/web/2019/06-190704-2a

Energy Strategies of Past and Future

(EPFL, July 04, 2019)

Countries around the world are formulating and working on energy and environment strategies to curb climate change. Such plans simultaneously indicate that governments must take certain major decisions, such as prioritizing one energy source above another or targeting investment in certain technologies. Such strategies are often based on projections about natural gas prices, solar power costs and the like. Although, energy planners and experts get such forecasts with advanced models, they stretch out 20 to 50 years and are - due to the long-time horizon - often wrong. This can lead to bad policy decisions in turn. EPFL scientists have developed a new model which takes into account such uncertainties in energy strategy decisions. The team states that in prior projections many mistakes were made, and values were of by up to 300%. Factoring in uncertainties, renewable energy strategies are not necessarily more expensive than fossil fuel ones.
http://swissinnovation.org/news/web/2019/06-190704-ef

Plant-Based Meat

(ETH Zurich, July 08, 2019)

Meat demand around the globe is at unsustainable high levels. Global meat production accounts for 18 percent of greenhouse gases, require large amounts of land and fertilizers and lead to resistance to antibiotics. To provide a remedy for this problematic situation, ETH Zurich Pioneer Fellow Lukas Böni and his team who founded the startup Planted started producing plant-based chicken from peas. Planted's alternative is not only environmentally friendly but also cruelty-free and cheaper in the long term. One and a half years ago, they have gotten into experimenting with meat substitutes made of plants, which imitate both texture and taste of the original meat. The team of Planted has tested their product with first consumers and received positive feedback. They currently deliver to 10 selected restaurants in Zurich, Lucerne and Geneva.
http://swissinnovation.org/news/web/2019/06-190708-39

Perception Mechanisms in Plants Discovered

(University of Zurich, July 11, 2019)

An international research team with the involvement of the University of Zurich recently discovered important perception mechanisms that regulate plants. These mechanisms are comparable to insulin in humans, as they produce peptide hormones which are responsible for internal processes and responses, such as growth and immunity. RALF23 is one of these peptides and belongs to the large RALF family of plant peptides. The research has revealed a novel recognition mechanism for the RALF23 peptide signals by plant receptors. These findings allow a better understanding of various important plant processes and additionally reveal how

several important receptors control fundamental mechanisms in plants. The relevance of the study is mainly in the development of new drugs and the fight against plant diseases.
http://swissinnovation.org/news/web/2019/06-190711-13

Receding Glaciers and Policy Relevance

(University of Zurich, July 11, 2019)

If glaciers melt floods, mudslides can be the consequence, which would require to adjust hazard maps. Additionally, but somewhat less serious is the decrease in tourism due to less picturesque landscapes. According to a glacier expert of the University of Zurich who has conducted research in this area, depending on which scenario will become a reality, Switzerland's glaciers might recede significantly by the end of the century. If the temperature rises by 4 degrees Celsius, only the highest altitude ice tongues would remain. However, if climate policies have an effect and a 1.5-2-degree scenario is achieved, one third of the glacier volume could be saved. In affluent Switzerland, the decline may not have very grave consequences, yet two parallel approaches should be pursued: Reducing emissions and adapting scenarios. Regions in Central Asia have fewer possibilities to adapting and major problems might arise due to receding glaciers; hence rigorous policies are particularly important there.
http://swissinnovation.org/news/web/2019/06-190711-1c

Method to Concentrate Fertilizer from Wastewater

(EPFL, July 16, 2019)

The Yverdon-les-Bains wastewater treatment plant is known as a pioneer as it was the first to have a stripping membrane system for nitrogen recovery. Such a system uses a polypropylene membrane to filter the nitrogen from the rest of the wastewater, after the effluent has gone through some initial processing. By filtering the nitrogen in this way, the plants can reduce the nitrogen emissions into streams and produce a high-quality liquid fertilizer, which has been certified. Two master students of EPFL concentrated on making the recovery process more efficient by increasing the nitrogen concentration to above 40 g/L. The advantage is that it cuts the cost of storing and transporting the fluid. By using the osmotic distillation technique usually used to concentrate fruit juice, the students developed a nitrogen-specific method. It was tested together with industry and the project was overall a great success.
http://swissinnovation.org/news/web/2019/06-190716-70

7. Engineering / Robotics / Space

Ridesharing Simulation with Adverse Results

(ETH Zurich, June 07, 2019)

The future of transport is assumed to bring autonomous driving, new energy vehicles and a ride sharing economy. However, how fast and if these trends will penetrate the market, is currently uncertain. A team of scientists at ETH Zurich has simulated how the congestion would change if automated taxis were introduced at some point in the coming two decades. The results of the simulation were rather surprising as they indicated that ridesharing would increase kilometers driven and not decrease the number of private vehicles. An amount of 3,000 self-driving taxis at a per kilometer price of 56 cents - as compared to the conventional taxi price of 2.76 USD per kilometer - is the optimum in the software. A lower number is not attractive, and a higher number is likely to make the service too expensive. Compared to cars, self-driving buses would approximately halve the current cost.
http://swissinnovation.org/news/web/2019/07-190607-1e

Celebrating the 50th Anniversary of Moon Landing in Bern

(University of Bern, June 07, 2019)

At the end of June, the University of Bern is holding a diverse science festival to mark the occasion of the 50th anniversary of the moon landing: a multimedia show on Bundesplatz will display milestones in Bernese space exploration, high-ranking representatives from the big space agencies will discuss the future of space exploration, there will be a chance to look up at the night sky from the Grosse Schanze and rockets will be built. The rector of the University of Bern is delighted that lots of Bernese culture institutions will be engaging with the moon landing and space exploration. He also hopes that lots of Bernese people can be inspired with this program.
http://swissinnovation.org/news/web/2019/07-190607-7c

Meteorite Mystery Solved

(ETH Zurich, June 13, 2019)

When the sun was still a young star, gas and dust assembled around it. Over time, this dust clumped together and formed boulders which collided with other boulders, resulting in merges and thus growing masses. Finally, they formed into rocky planets like Mercury, Venus, Earth or Mars as well as hundreds of thousands of asteroids. Such collisions between asteroids resulted in debris hurling into space before falling to Earth as meteorites. Special attention has been devoted to mesosiderites, meteorites that are made up of silicate rock fragments and metal. They originate from a celestial body with a crest and a liquid core and probably emerged after a collision. ETH Zurich researchers have determined the age of such meteorites and could, thus, solve the mystery of their origins and formation. They are over 4.5 billion years old and originate from Vesta, the second-largest asteroid in the main belt.
http://swissinnovation.org/news/web/2019/07-190613-cc

AI-Drone Olympics With Swiss Participant

(University of Zurich, June 14, 2019)

Davide Scaramuzza, a professor for robotics and founder of the Robotics and Perception Group at University of Zurich, has qualified to participate at the international drone Olympics "AlphaPilot Innocation Challenge" in the United States. A total of 242 teams from 81 countries applied to participate, however, the pre-selection which tested the drone's software among other verticals only saw 9 teams qualify for the finals. The drones have to recognize the racetrack with Artificial Intelligence, compete against each other and even compete against a human drone pilot. Whichever autonomous drone manages to complete the 300-meter track with 25 to 30 hoops in the shortest time and with the highest accuracy, will win and receive one million dollars. The international competition's goal is to promote AI for race drones. Professor Scaramuzza mentioned how exciting it is for him to pit himself against some of the most talented drone developers.
http://swissinnovation.org/news/web/2019/07-190614-f1

Swiss-Made Aviation Decarbonization

(ETH Zurich, June 18, 2019)

CO2 -neutral synthetic fuels are technically feasible today and the best promise for decarbonizing aviation. The most promising approach is using renewable energy to synthesize CO2-neutral hydrocarbon fuel out of water (H2O) and CO2 collected from ambient air. ETH researchers recently presented a breakthrough for highly efficient production of such fuel using solar thermal energy. However, it will take decades to build the production capacity to satisfy global aviation demand with synthetic fuel. The new ETH technology, for example, would require covering an area greater than that of Switzerland with solar thermal collectors. It will

be crucial to create an initial demand for synthetic fuels, for instance by requiring airline companies to mix in a fraction of synthetic fuel. This could prove a great opportunity for Switzerland, as many patents are held here, and the country has every reason to take the lead in making aviation sustainable.
http://swissinnovation.org/news/web/2019/07-190618-ef

ETH Rocket Takes Off

(ETH Zurich, June 20, 2019)

For more than a year, a team of ETH Zurich students has been developing and building a rocket. In late June, they were able to travel to New Mexico and take part in an international rocket competition. The so-called ARIS team consists of 30 students from ETH Zurich, ZHAW and Lucerne University of Applied Sciences, which have been working on developing the rocket for months. Competing against roughly 50 other teams, the goal is for the rocket to reach an altitude of 10,000 feet as precisely as possible and thereafter use a parachute to get back on the ground. It is the largest student rocket competition globally. The ARIS team came in on the second rank in the 10K Commercial of The Shelf Components category and got an honorable mention for their exceptional safety standards.
http://swissinnovation.org/news/web/2019/07-190620-1f

Metro Tunnel Heat Could Cover 1,500 Apartments' Energy Needs

(EPFL, June 25, 2019)

Until now, engineers have been unable to accurately calculate the amount of heat that tunnel air contains even though heat transfer happens in various ways in rail tunnels. For instance, when trains brake or accelerate, they produce heat that warms the surrounding air. That hot air mixes with other air in the tunnel and with heat radiating from the ground. Researchers at EPFL have now precisely quantified convection heat transfer in rail tunnels by using the new model. The team estimated how much energy Lausanne could save by fitting the future M3 metro line with a geothermal heat-recovery system, which would be a world's first. The research shows that fitting the heat-recovery system along 50–60% of the planned route, equal to 60,000 square meters of tunnel surface area, would cover the heating needs of 1,500 standard 80m2 apartments.
http://swissinnovation.org/news/web/2019/07-190625-e6

Second and Third Rank for Swiss Teams at Hyperloop Competition

(ETH Zurich, July 22, 2019)

Recently, Elon Musk has challenged student teams from around the world for the fourth time to build transport pods for the Hyperloop competition. In his venture to have people travel through vacuum tubes at speeds up to 1,200 km/h one day, the founder of SpaceX let's students design transport pods. Several hundred teams applied for the challenge, however, only 21 were finally invited. Among them were two Swiss teams - and both achieved great results. The pod of Swissloop, the team of ETH Zurich and other Swiss universities, reached a maximum speed of 252 km/h and achieved an astonishing second rank. EPFL also participated and came in on the third rank with a maximum speed of 238 km/h. Last year's winner, TU Munich even beat its previous record of 457 km/h and rocketed through the tube at 463 km/h. The Swissloop team will resume their work for the next year in autumn.
http://swissinnovation.org/news/web/2019/11-190722-3f

Conceptualizing a Lunar Habitat

(EPFL, June 26, 2019)

The first moon landing took place half a century ago in 1969. Now, students from various European universities are looking at the idea to establish a permanent settlement on the moon. To discuss and build a prototype lunar habitat in the ice that could one day support human life on the Moon, over 150 students met in Zermatt in Switzerland. The students are from various disciplines but will all be working on the same project and search for answers to some key questions. They include, for instance, the structure of the habitat, how oxygen, food and power will be supplied and means of communications. The work of the students was also on display in two different locations, one showcasing the conceptual and design pieces and the other one focusing on the scientific and technical pieces.
http://swissinnovation.org/news/web/2019/07-190626-fe

Robot Race with Industry Relevance

(EPFL, July 02, 2019)

EPFL conducted a unique robot competition where students and their robots were teamed up and did a race. The students lined up at the starting point and when it begun, they had to hold up signs which were designed for their robots to follow them. The first student-robot tandem that crossed the finish line, won the competition. This was tricky insofar as the students were required to develop their own algorithms and program the robot to recognize a visual signal. Additionally, they had to overcome the problems of interference with other participant's signs as well as light fluctuations. In self-driving cars, the algorithms are very similar to what the students designed, and the race's relevance also spreads to various other areas such as delivery drones to elderly care robots. It is hoped that the students will deepen their knowledge in this field and continue research on their own.
http://swissinnovation.org/news/web/2019/07-190702-ac

Ant-Like Robots with Collective Intelligence

(EPFL, July 10, 2019)

In the laboratory of EPFL robotics Professor Jamie Paik new ant-like robots have been developed. They weigh a mere 10 grams, are three-legged, T-shaped origami robots and can conduct five different locomotion gaits among them jumping and crawling. Even though, these tiny robots display minimal physical intelligence on an individual level, together as a group they can communicate, navigate and work on complex tasks. Every robot has the same anatomy, however, all of them are assigned a specific role depending on the situation. "Explorers" detect physical objects, "leaders" then give instructions on how to handle them. As for industrial or commercial applications of the robots, they could be deployed to locate a target without needing GPS thanks to their multi-locomotive and multi-agent communication capabilities and collective intelligence.
http://swissinnovation.org/news/web/2019/07-190710-24

Inspection Drones with Twice the Flight Time

(EPFL, July 12, 2019)

Industrial environments have begun to employ drones for various tasks, however, limited flight time is a major downside. Often, this limitation is caused by heavy batteries and inefficient propellers. Meanwhile, drones' flight time is proportional to their size. Flybotix, an EPFL startup, has developed a novel drone with two propellers and an advanced stabilization system, allowing the doubling of flight time of compact drones. This system is ideal to inspect hard-to-reach parts of industrial facilities and the technology is usable in almost every drone application. Additionally, the drone of developer Samir Bouabdallah is collision tolerant thanks to an outer ring made of foam. After a 10-day road trip in China with

the Venture Leaders program, the startup generated leads and fostered connections and are now hoping to launch the drones in the Chinese market soon.
http://swissinnovation.org/news/web/2019/00-190712-2a

8. Physics / Chemistry / Math

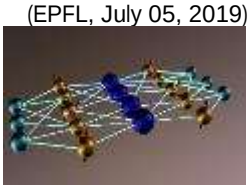
Google Funds EPFL's Nuclear Energy Research

(EPFL, June 17, 2019)

It was recently announced that Google is funding a 4-year research project at EPFL's Laboratory for Ultrafast Microscopy and Electron Scattering (LUMES). This research project is looking at developing new methods to spatio-temporally manipulate the wavefunction of fundamental particles as a means of precisely effecting changes in an atom's nucleus via Nuclear Excitation by Electron Capture (NEEC). To put it simply, the team will investigate the nucleus of atoms and try to reach the energy stored in there. Googles involvement in this is insofar not surprising as the IT giant has been looking at ways to accelerate nuclear energy research. This kind of research could provide breakthroughs on the path to clean and potentially very compact atomic energy sources without harmful products.
http://swissinnovation.org/news/web/2019/08-190617-78

Neural Networks to Better Understand Complex Quantum Systems

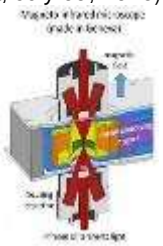
(EPFL, July 05, 2019)



Even on the scale of everyday life, nature is governed by the laws of quantum physics. These laws explain common phenomena like light, sound or heat. Interestingly, the laws of quantum physics predict a variety of phenomena that defy intuition. Physicists at EPFL, France, the UK and the US have developed a new computational method, based on neural networks, which can simulate open quantum systems with unprecedented versatility. The team combined advances in neural networks and machine-learning with quantum Monte Carlo tools, which allowed to predict properties of quantum systems of considerable size and arbitrary geometry. The method is set to become a tool of choice for the study of complex quantum systems, and, looking a bit more into the future, for assessing the effects of noise on quantum hardware.
http://swissinnovation.org/news/web/2019/08-190705-ce

Controlling Terahertz and Infrared Waves

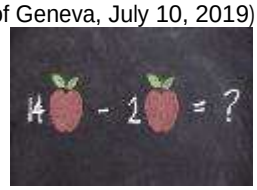
(University of Geneva, July 09, 2019)



One of the great challenges in physics is the control of infrared and terahertz waves by using magnetic or electric fields. This - if achieved well - could revolutionize opto-electronics, medical diagnostics and telecommunications. According to a theory established in the 2000s, using graphene in a magnetic field should enable absorbing terahertz and infrared light on demand as well as controlling the direction of the circular polarization. An English-Swiss research team in which the University of Geneva was prominently represented conducted experiment on exactly this theory. They could proof it when they achieved the predicted results and their study shows that they found an efficient way to control infrared and terahertz waves. Additionally, they showed that graphene keeps its promise and will probably the material of the future, both on earth and in space.
http://swissinnovation.org/news/web/2019/08-190709-57

Primary School Subtractions and Mathematicians

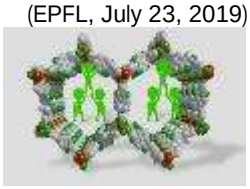
(University of Geneva, July 10, 2019)



Mathematics is often seen as the epitome of abstract thinking; however, our knowledge of the world seems to interfere with basic mathematical problems. A study to which University of Geneva contributed examined how people's non-mathematical knowledge interferes with the ability to solve simple mathematical problems. They gave two different types of primary school level mathematical problem sets that can be solved by a single simple solution to grown-ups that attended university as well as to mathematicians. One part of the problems was framed mentally as sets, the other part as values on axes. Depending on how a question is formulated, people struggle to answer which shows that many cannot reason in an abstract manner. For the axes questions, 82% of adults answered correctly as compared to only 47% when framing the problems as sets. The respective numbers for mathematicians were 95% for axes and 76% for set problems.
http://swissinnovation.org/news/web/2019/08-190710-98

Polymer-Induced Stabilization of Metal-Organic Frameworks

(EPFL, July 23, 2019)



Metal-organic frameworks (MOFs) are a special class of sponge-like materials with nanopores. These pores lead to a record-breaking internal surface area achieving up to 7,800 square meters per single gram. MOFs have various applications like carbon capture, water-cleaning, separating gases or mimicking DNA. The downside is that the pores tend to collapse, depending on the pore diameter, heat and other factors. A focus of scientists was to maximize internal surface area whilst keeping them from collapsing. Recently, researchers at EPFL managed to stabilize these pores by adding polymers. Even after heating the MOFs to up to 150°C - a previously unreachable temperature - the high surface areas and crystallinity were maintained. According to the researchers, the polymer-induced stabilization will enable new MOFs that were inaccessible before.
http://swissinnovation.org/news/web/2019/08-190723-12

Sustainable Methanol Production Ready to Market

(ETH Zurich, July 29, 2019)

The worldwide reliance on fossil carbon sources of petroleum, natural gas and coal is still very high. Even though measures have been taken to decrease this reliance by manufacturing liquid fuels and chemical products from other, more sustainable sources, no ideal solution has been found yet. The French oil and gas company Total has teamed up with scientist at ETH Zurich to develop a novel technology that efficiently converts CO2 and hydrogen directly into methanol. Methanol is a commodity or bulk chemical, which can be converted into fuels and various chemical products. A chemical catalyst based on indium oxide is the core of the technology. It is capable of catalyze the necessary chemical reaction that only generated methanol with virtually no by-products other than water. It is also a highly stable catalyst. Compared to other methods to produce green fuels, this one is almost ready for the market.
http://swissinnovation.org/news/web/2019/08-190729-46

9. Architecture / Design

NEST Wins Building Award

(Eawag, June 11, 2019)

In June, the NEST building of Eawag and Empa has received the Building Award during a ceremony held in KKL Lucerne. In total, 21 projects had been nominated and two Empa projects were shortlisted in the category "Research and Development", namely NEST and memory-steel. Finally, NEST won the trophy as it offers both a research and an industry platform in order to try and implement new ideas, validate and further

develop them in a real-world environment. It has been opened in 2016 in Dübendorf and the two institutions operate it together. The Building Foundation has for over 13 years been committed to promoting next generation engineers in the construction industry. Meanwhile, the Building Award does exactly that as it honors remarkable and innovative engineering achievements in construction.
http://swissinnovation.org/news/web/2019/09-190611-2a

10. Economy, Social Sciences & Humanities

Paternal Care Important for Offspring's Brain Size

(University of Zurich, June 03, 2019)

In mammalian species, the bigger the brain size as compared to the body, the more intelligent the organism is. The development of a large brain requires a significant amount of energy and females of many mammalian species therefore rely on the help of other group members to raise the offspring. Researchers of the University of Zurich examined whether there is a difference between species where the father assists and species where other group or family members assist. By looking at 480 species, they found that the father is most dependable, and it very much matters if the care is parental or alloparental. For example, the help of older siblings is far less reliable as in many species they look out for themselves first when food is scarce. Fathers tend not to do so. Females cannot energetically afford offspring with large brains unless reliable help - paternal help - is provided.
http://swissinnovation.org/news/web/2019/10-190603-51

Milk Teeth Lead to Discovery of Ice Age Population

(University of Bern, June 06, 2019)

Two milk teeth that date back 31,000 years found in the Northeast of Siberia led to the discovery of an old ethnic group. The so-called Ancient North Siberians lived during the last ice age under extreme conditions. They were fast at adapting to new environments and very mobile. Regarding food, the group seems to have hunted woolly rhinos, woolly mammoths and bison. The international research team which was led by the University of Cambridge included a professor from the University of Bern, and the study was recently published in the science journal Nature. The team additionally examined the DNA of the ancient inhabitants of Siberia and could find some missing pieces to the history of humankind.
http://swissinnovation.org/news/web/2019/10-190606-3a

Cultural Background and Debt Financing

(University of Zurich, June 11, 2019)

It is known that various factors such as size, profitability and industry influence the financial structure of a given company. An economist at University of Zurich has now researched whether and to what extent the nationality of the manager influences financial decisions like the mix of debt or equity financing. To do so, she focused on 3,500 companies in the region of South Tyrol, as the characteristics entailing a uniform jurisdiction but two differing cultural and linguistic groups - Italian and German - was ideal. A linguistic analysis is already quite revealing: The German word for debt "Schuld" has a negative moral connotation, whereas the Italian "Debito" is a rather neutral term. From this, the economist hypothesized that companies with Italian-speaking managers might be more prone to borrow money and accumulate debt than companies with German-speaking managers. The study confirmed this and revealed some other interesting aspects.
http://swissinnovation.org/news/web/2019/10-190611-eb

Improving Online Accessibility for Disabled People

(University of Zurich, June 13, 2019)

Often, when designing websites and online services, the special needs of people with disabilities is not take into account. For a blind person, for instance, it is virtually impossible to prove that he or she is not a bot with one of the captchas visual tests. The inability office of the University of Zurich is working on exactly this issue. The website of the UZH itself is part of this problem: It is very hard for disabled people to enroll for study programs or gain access to crucial information like semester fees. Additionally, many elderly people struggle with the internet and websites, which translates into a loss of economic potential as they often have accumulated wealth. As part of the Diversity Policy, UZH wants to make information more accessible by letting the staff test the accessibility of websites and apps.
http://swissinnovation.org/news/web/2019/10-190613-0b

Switzerland: Highest Per Capita Gold Density

(University of St. Gallen, June 13, 2019)

The University of St. Gallen has recently published the "Precious Metal Atlas", which constitutes a representative nationwide study of Swiss consumers preferences when it comes to precious metals as an investment. The study revealed that gold is - after real estate and before shares - the second most popular form of investment. Platinum comes in at the 9th rank and silver on 13th. A further finding was that 20% of all people in the study indicated that they plan on investing in precious metals. This preference for gold and metals is not surprising as today's financial markets are marked by low interest rates, fading attraction of classic savings in combination with economic and political uncertainties. Meanwhile, the Swiss National Bank's vault gives shelter to 1,040 tonnes of gold, which amounts to 127 grams per inhabitant. Switzerland is internationally leading when it comes to gold density per capita.
http://swissinnovation.org/news/web/2019/10-190613-fe

Determinants of Honesty in Returning Lost Wallets

(University of Zurich, June 20, 2019)

Economic theory suggests that the higher the content of a lost wallet, the lower the probability it being returned. Researchers of the University of Zurich have done a comprehensive study in with adverse results. The experimental study was designed in a way that 17,000 apparently lost wallets with differing contents were left at hotels, banks, museums or police stations and the researchers then examined which factors influence whether or not the wallet is returned. They found that a wallet with a key is more likely to be returned than one that only contains money. Additionally, the results demonstrated that in countries like Switzerland, New Zealand or the Nordic countries, the higher the monetary content, the more likely it was to be returned. It was concluded that for many people the psychological cost of adjusting one's self-image seems to be higher than the monetary gain.
http://swissinnovation.org/news/web/2019/10-190620-79

Better Understand Online Networks

(EPFL, June 28, 2019)

EPFL researchers have studied the dynamics of network structure using signal processing and network theory, developing an algorithm to automatically detect unusual activity in constantly changing, complex systems like Wikipedia. In addition to a better understanding of online networks, their work brings exciting insights into human social behavior and collective memory. The group of researchers is currently collaborating with developers of a free offline web browser, which aims to bring compressed versions of Wikipedia to those without free access to the internet. Other applications of the algorithm could include studying the spread of

fake news on Twitter by monitoring spikes in retweets. However, these topics are more challenging to study than Wikipedia due to smaller amounts of freely available data.
http://swissinnovation.org/news/web/2019/10-190628-82

How to Increase Physical Activity at School?

(University of Geneva, June 04, 2019)

At what age do children lose the desire to exercise? Researchers from the University of Geneva found out that from the age of 9, the positive reasons for exercising begin to be replaced by more displaced incentives: to get a good mark or improve your image with others. These results, which are published in the journal Psychology of Sport and Exercise, call for a more detailed analysis of how physical education is taught in schools. The aim of the project is to work on the curriculum, course structure and teacher involvement to help children keep or boost their positive motivations for physical education.
http://swissinnovation.org/news/web/2019/02-190604-24

Financial Stability and Climate Change

(University of Zurich, July 01, 2019)

Climate change is a systemic threat to financial stability. The question is whether banking regulation can address climate change and what policy makers task in this regard is. The Basel Committee on Banking Supervision has issued a warning to its members about how environmental risks can affect banking stability, yet no recommendations on how to tackle or deal with these risks have been enunciated. It is the job of regulators, policy makers and banking institutions to manage such environmental systemic risks as well as redeploy capital to sectors which contribute to sustainable development. Until now, many risks have not properly been priced by the market, such as the societal costs of carbon emissions leading to uncoordinated and insufficient approaches. Some countries have taken steps to incorporate environmental sustainability risks into financial regulation, such as Brazil and China.
http://swissinnovation.org/news/web/2019/10-190701-b9

Insurance Companies' Climate Friendliness

(University of St. Gallen, July 12, 2019)

Being a prominent topic in society, climate concerns have started entering the financial world a while ago. A novel study by the University of St. Gallen has now showed that the majority of European insurance companies has decreased or stopped investments in CO2-emitting industries. The same trend is visible for Swiss companies who have made their investment portfolio more environmentally friendly over the past years. Capital assets of 35 European insurance companies were examined in a ten-year time frame between 2008 and 2018, five of the companies were Swiss. Most of these insurance companies including the Swiss representatives have become significantly more climate neutral. The researchers suggest that investments in CO-damaging industries should negatively impact the share price and they mention measures. For instance, equity capital requirements for climate-damaging investments or disclosure of a key figure which indicates how green an institution is.
http://swissinnovation.org/news/web/2019/10-190712-02

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

#SwissTech: 22 Swiss Startups Prove Swiss Excellence at CES ASIA 2019

(The Federal Council, June 11, 2019)

Between June 11 and 13, Switzerland made its second appearance at Asia's largest tech and digital expo, the Consumer Electronics Show Asia (CES ASIA). Organized by swissnex China in partnership with Presence Switzerland and other institutional partners, the #SwissTech Pavilion gave Swiss startups a platform to expose themselves to the Chinese market and showcase Switzerland's leading position as a center of technology and innovation. This was a great opportunity as CES ASIA attracts over 46,000 visitors and 500 exhibiting companies yearly. The #SwissTech Pavilion with 300 square meters in size was prominently located within the Startup Park, where the budding startups' market-ready innovations for tomorrow were prominently displayed to potential clients, partners and investors. Switzerland showcased the largest country pavilion at CES ASIA 2019, and will take part again in 2020.
http://swissinnovation.org/news/web/2019/11-190611-8d

12. General Interest

Over-Standardization in Fair Trade

(University of Lucerne, June 13, 2019)

Fair trade leads to food waste, this is the conclusion a researcher at University of Lucerne has drawn from looking into fair trade standards for pineapple farmers in Ghana. It was examined at which point in the process the standards are being enforced and how they influence everyday life of the local producers and farmers. Such standards not only regulate sustainability questions but also set rules for size, color, form and weight of the fruit. Being able to follow all these rules is a very challenging and hard for smaller farmers' cooperatives. This is paradoxically insofar as fair trade originally was set out to help exactly these small farmers. Some of them are currently contemplating to hand back the fair trade certificate. According to the researcher it would help to abolish some of these standards. However, this assumes that consumers are willing to buy imperfect pineapples.
http://swissinnovation.org/news/web/2019/12-190613-97

EPFL on the Way to Gender Equality

(EPFL, June 14, 2019)

The women's strike of June 14 was a movement to openly discuss and line out where gender inequalities exist and how to achieve an equal society. A group of female students, professors and staff at EPFL and University of Lausanne also the opportunity to strike and hand over a manifesto to representatives of the higher educational institutions. The famous strike in 1991 turned o into an effective catalyst for improving women's standing in society, their opportunities and working conditions. It is very much hoped that this year's demonstrations will have a similar magnitude in change they bring. When looking at EPFL, some steps have been taken as for example setting a target rate of 40% of open faculty positions that should go to women within the next 5 years. Additionally, the salary pay gap fell from 1.9% in 2015 to 1.3% in 2019, implying the gap is shrinking at the polytechnic institution.
http://swissinnovation.org/news/web/2019/12-190614-d2

13. Calls for Grants/Awards

Call for Swiss Startups for CES ASIA 2020

(swissnex China, July 31, 2019)

swissnex China is looking for Swiss startups to join CES ASIA 2020! At CES ASIA 2019, swissnex China had the largest country pavilion and brought 22 top Swiss DeepTech startups. The startups had the chance to showcase their excellence during three days in the #SWISSTECH Pavilion, got a chance to meet Swiss Ambassador to China Bernardino Regazzoni, and Gary Shapiro, CES's president and CEO. Additionally, a separate pitching night with 180 investors and industry experts allowed the startups to facilitate cooperation and partnerships. The CES ASIA 2020 pavilion is already booked and swissnex China is looking for Swiss DeepTech startups interested in coming to Shanghai, China, next year. Please sign up under the following link until January 31, 2020: https://is.gd/SvfeSS
http://swissinnovation.org/news/web/2019/13-190731-65

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

Call: Team-Oriented Cross-Border Research

(Swiss National Science Foundation, May 12, 2019)

SPIRIT facilitates knowledge exchange between Swiss researchers and researchers in selected partner countries of low and middle income. Funding is awarded to research projects with clearly defined goals that are submitted by excellent research consortia from two to four countries. Researchers from all disciplines can apply for a SPIRIT grant; the topics are chosen by the researchers themselves. The grants contribute to the education of researchers in all participating countries. Special focus is given to equal opportunities and the promotion of women scientists, as well as to raising awareness of gender-specific questions. The submission deadline is December 31, 2019.
http://swissinnovation.org/news/web/2019/13-190512-86

Call: Young Talents in Scientific Research

(Swiss National Science Foundation, May 30, 2019)

The Agora scheme aims to promote the spread of knowledge, as well as the exchange of views and perspectives about scientific research. It therefore encourages projects involving two-way processes - with interaction and listening - which generate dialogues between researchers and the public. Grants of between CHF 5,000 and CHF 200,000 are awarded for both small communication formats and large-scale initiatives with more far-reaching goals. The submission deadline is September 01, 2019.
http://swissinnovation.org/news/web/2019/13-190530-cf

Call: Young Talents in Clinical Research

(Swiss Academy of Medical Sciences, July 03, 2019)

The SNSF is launching a call for targeted funding of investigator-initiated clinical studies that are outside the industry focus. The special programme for Investigator Initiated Clinical Trials (IICTs) of the Swiss National Science Foundation supports clinical studies on documented but under-researched medical needs. Though important for patients, these study topics remain outside the industry focus. The IICT programme does not provide support for non-randomized and uncontrolled studies. The deadline for submitting proposals on mySNF is November 01, 2019 at 17:00 Swiss local time. The SNSF recommends drawing up the study protocol with help from local clinical trial units.
http://swissinnovation.org/news/web/2019/13-190703-7d

Call: PRIMA Program for Excellent Women Researchers

(EPFL, July 30, 2019)

The EPFL School of Life Sciences wishes to host and support candidates applying for the PRIMA program for excellent women researchers. The application is open to researchers working in any area of the life sciences, but quantitative and computational biology are particularly encouraged. PRIMA grants are aimed at excellent women researchers who show a high potential for obtaining a professorship. PRIMA grants cover the PI's salary as well as project funds for a five-year period (www.snf.ch/en/funding/ careers/prima/Pages/default.aspx). The application deadline is November 1, 2019. The EPFL School of Life Sciences will evaluate pre-applications for potential Institutional support in September 2019, ahead of the official SNSF deadlines. Your pre-application to EPFL must include: Your brief CV (max 3 pages), your publication list (with complete author list), a 3-page research proposal for the 5-year period, and 2 or 3 reference letters – in one PDF file not exceeding 10 Mb. The deadline for the pre-application to EPFL is September 10, 2019 at 17:00 CET. The complete application material, including reference letters, must be submitted to this email: sv.call@groupes.epfl.ch.
http://swissinnovation.org/news/web/2019/13-190730-f1

Call: SNSF Eccellenza Professorial Fellowship

(EPFL, July 31, 2019)

The EPFL School of Life Sciences wishes to host and support candidates applying for a SNSF Eccellenza Professorial Fellowship. The SNSF Eccellenza Professorial Fellowships are aimed at researchers who have a doctorate or equivalent qualification pursuing an academic career. The grant covers the PI's salary as well as project funds for a five-year period (http://www.snf.ch/en/funding/careers/ eccellenza). The deadline for this fellowship program is February 1, 2020. The EPFL School of Life Sciences will evaluate pre-applications for potential Institutional support in September 2019, ahead of the official SNSF deadlines. Your pre-application to EPFL must include: Your brief CV (max 3 pages), your publication list (with complete author list), a 3-page research proposal for the 5-year period, and 2 or 3 reference letters – in one PDF file not exceeding 10 Mb. The deadline for the pre-application to EPFL is September 10, 2019 at 17:00 CET. The complete application material, including reference letters, must be submitted to this email: sv.call@groupes.epfl.ch.
http://swissinnovation.org/news/web/2019/13-190731-57

Upcoming Science and Technology Related Event

Symposium in Nobel Laureate Prof. Werner Arber's Honor
August 18, 2019
https://is.gd/bglvCV
Microbiology, Genetics
Basel

Symposium "Trends in Structural Biology"
August 19-20, 2019
https://is.gd/LMlY7q
Structural Biology
Zurich

Smart Cities – Wie smart sind wir schon?
August 29, 2019
https://is.gd/SryiCy
Energy, Smart Lighting
Chur

International Conference on Physical & Theoretical Chemistry
September 2-3, 2019
https://is.gd/UOTTpU
Physics, Chemistry
Zurich

Swiss Green Economy Symposium
September 3, 2019
https://is.gd/0LHFRy
Sustainability, Policy
Winterthur

The Swiss Legal Tech
September 3-4, 2019
https://is.gd/TA2Kvp
Legal Technology, RegTech
Basel

The World Academic Summit
September 10-12, 2019
https://is.gd/42JaAs
Global Higher Education
Zurich

19th Annual Biotech in Europe Forum
September 25, 2019
https://is.gd/MzEysi
Biotechnology
Basel

The **Science-Switzerland** newsletter is a bimonthly electronic publication keeping you updated on all the latest news on Swiss science, technology, education, innovation and the arts. It is an official publication in English from a single source, with executive summaries of top-highlights on education, of new discoveries in science, and of the latest top-of-the-line technologies and innovational strengths of Switzerland. The Science-Switzerland Newsletter is produced by swissnex China in collaboration with the swissnex Network.

Science-Switzerland Back Numbers: www.swissinnovation.org/Science-Switzerland