



Science-Switzerland, October- November 2019

News on Swiss science, technology, education and innovation



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Bioinformatician Receives Cancer Research Award 2019

(University of Bern, October 18, 2019)

The Dr. Josef Steiner Cancer Research Foundation, which is comprised of physiologists from the Universities of Bern, Geneva and Zürich and chaired by the member from Bern, is awarding the Dr. Josef Steiner Cancer Research Award 2019 to Prof. Serena Nik-Zainal. The bioinformatician from the Department of Medical Genetics and the MRC cancer unit at the University of Cambridge is receiving the award in recognition of her groundbreaking research in developing new methods in the field of bioinformatics for the clinically relevant classification of tumors. The award, which was donated in the 1980s by Dr. Josef Steiner, a pharmacist from Biel/Bienne, is being staged for the 21st time this year. The renowned research award, which comes with a cash prize of one million Swiss francs, is awarded every other year to an excellent project in the field of cancer research.

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Research on Heart Transplantation Awarded

(University of Bern, November 13, 2019)

It is undisputed that there is a shortage of organs for heart transplantation. To address this, interest in donation after circulatory death (DCD) has been revived. More than 100 DCD heart transplantations have been reported worldwide in the last 5 years. Although its feasibility has been demonstrated, DCD heart transplantation raises concerns as it is accompanied by a damaging period of warm ischemia (stopping of blood supply) prior to organ procurement. As mitochondria are damaged by warm ischemia and reperfusion. This damage results in their inability to produce sufficient energy for heart contraction, their production of damaging free radicals, and their release of components, which activate inflammatory processes. The research team has received this year's Johanna Dürmüller-Bol DBMR Research Award of the Department for BioMedical Research (DBMR) for results showing that mtDAMPs are released by DCD hearts following warm ischemia and early-reperfusion levels correlate with subsequent contractile recovery.

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ETH Latsis Prize Awarded to Professor of Biosystems Science and Engineering

(ETH Zurich, November 15, 2019)

Randall Platt was awarded the ETH Zurich Latsis Prize. The professor in the Department of Biosystems Science and Engineering at ETH Zurich in Basel has carried out exceptional work in the field of genome engineering. He is particularly renowned for the Cas9 mice, an animal model he developed based on the CRISPR-Cas system, which allows scientists to edit genes in individual organs or tissues in order to study their function or role in disease. Platt's other pioneering developments include a cellular biological data logger that is also based on the CRISPR-Cas system. Cells can use it to record which genes are being expressed throughout time by converting gene expression information into DNA sequences that can be accessed later.

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1. Policy

Swiss Research and Innovation Promotion Agencies Strengthen Collaboration with Brazil

(Admin.ch, November 08, 2019)

On 8 November 2019, the Swiss delegation, comprising representatives from funding agencies and academia and headed by Ambassador Mauro Moruzzi, was welcomed by senior representatives of the Ministry of Science, Technology, Innovation and Communications (MCTIC) and the main Brazilian research and innovation funding agencies. Later that day, Innosuisse, the Swiss Innovation Agency, signed its second agreement with a foreign partner - Brazilian Innovation Agency EMBRAPA. The agreement stems from a desire to foster collaboration on innovation between Switzerland and Brazil, one of the world's largest economies and the leading partner country for Swiss researchers in Latin America.

[/web/2019/01-191108-6a](#)

Swiss Security Policy 2019

(ETH Zurich, November 11, 2019)

The Center for Security Studies of the ETH Zurich just released its new Bulletin on Swiss Security Policy 2019. The bulletin summarizes a few of the key issues currently facing the international community and Switzerland in particular. Major powers are increasingly challenging the international system's established rules and norms. This has consequences for Switzerland. The boundaries between war and peace as well as between economic and security policy are becoming more fluid. Additionally, many small states face considerable challenges when deciding on the future orientation and composition of their defense forces. The geostrategic environment is becoming increasingly volatile and harder to predict, defense technology is rapidly changing, and financial leeway in defense expenditures is still limited.



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Meeting between Guy Parmelin and Chinese Minister of Education

(Admin.ch, November 14, 2019)

On November 14, 2019, Federal Councillor Guy Parmelin, Head of the Federal Department of Economic Affairs, Education and Research (EAER), met Chen Baosheng, the Chinese Minister of Education, in Bern. The meeting took place on the fringes of the fourth meeting of the Joint Working Group on Higher Education and Vocational Education and Training (VET). VET was a priority of the talks between the Ministers Parmelin and Chen. China has carried out far-reaching reforms to adapt training programs to the needs of the labor market, using the Swiss dual VET system as a model. Since 2014, the two countries have set up a working group to improve the exchange of information and experience in the fields of higher education and VET, and to facilitate the movement of students and young researchers.

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Switzerland's Outstanding Role in Space Debris Removal

(Admin.ch, November 28, 2019)

On November 27 and 28, 2019, State Secretary Martina Hirayama participated in the meeting of the European Space Agency's ESA Ministerial Council in Seville ("Space 19+"). At this meeting, attended by the ministers responsible for space affairs of the 22 ESA Member States, the Council discussed current programs and new initiatives and agreed on the Agency's budget for the next three years. Switzerland has further strengthened its commitment in space: it contributes to securing Europe's access to space (Ariane and Vega), participates in a global environmental observation project, plays a leading role in the reduction of space debris, makes an important contribution to a reusable "mini shuttle", and participates in "Artemis", the US human lunar exploration project.

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FDA approves Roche's Tecentriq plus chemotherapy

(Roche, December 04, 2019)

Roche announced that the US Food and Drug Administration (FDA) approved Tecentriq® (atezolizumab) in combination with chemotherapy (Abraxane® [paclitaxel protein-bound; nab-paclitaxel] and carboplatin) for the initial treatment of adults with metastatic non-squamous non-small cell lung cancer (NSCLC) with no EGFR or ALK genomic tumour aberrations. This approval is based on results from the Phase III IMpower130 study, which showed Tecentriq in combination with chemotherapy helped people live significantly longer compared to chemotherapy alone. The Tecentriq-based combination also significantly reduced the risk of disease worsening or death compared with chemotherapy alone

</web/2019/01-191204-ab>

2. Education

Future Organization Report 2019 on Agile Adaptation in Companies

(University of St.Gallen, October 18, 2019)

Companies need to adapt at an even faster rate to changing market and customer requirements. Agile working can be an important key to success with this. But how agile are companies really? This is the question that is tackled in the 1st Future Organization Report 2019, which surveyed more than 500 managers and employees. The findings show what the key success factors are and where the biggest risks lie. The key factors for success include a company-wide awareness of transformation, organisational engagement and the "empowering" conduct of managers.

</web/2019/02-191018-f4>

First Human Rights Center at European Business School

(University of Geneva, November 21, 2019)

On 25 November 2019, the University of Geneva (UNIGE) launched the first Human Rights Center at a business school in Europe. The Geneva Center for Business and Human Rights (GCBHR) aims to provide a safe environment for businesses to discuss urgent human rights issues and train future leaders to develop and integrate human rights standards in their respective industry sectors. The GCBHR works with the NYU Stern Center for Business and Human Rights to promote human rights in business education through the Global Network of Business Schools for Human Rights.

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Learning for Life

(University of Zurich, November 28, 2019)

Does our academic performance have an effect on our personal development? A new study by UZH education evaluation specialists has investigated this interesting question. The study concluded that the more learning progress students achieve over the course of their schooling, the higher they will score when it comes to personal development. The study suggests that neither the students' family background, initial level nor intelligence play a role when it comes to developing positively. In addition, the team of researchers also found that feeling connected to school and academic performance seem to influence one another: Higher school bonding leads to better performance, and better performance increases students' bonds with school.



[/web/2019/02-191128-46](#)

3. Life Sciences / Health Care

Environmental Estrogen Pre-Birth Burden

(EMPA, October 10, 2019)

Early childhood life in the womb is particularly sensitive to the effects of environmental pollutants. A team from Empa and the University of Vienna has now been able to show how a pollutant from contaminated food - the environmental estrogen zearalenone - spreads in the womb and is metabolized into harmful metabolites. Xenoestrogens are absorbed through the environment, especially through food. As oestrogen-like substances, they can have a profound effect on the body's hormonal balance. It is assumed that exposure early in life to foreign estrogens many decades later could have an effect on various diseases such as breast or cervical cancer, but also on other manifestations such as premature puberty or infertility. With the new analytical method, researchers hope to be able to better investigate the exposure and combinatorial effects of environmental pollutants in the human body.

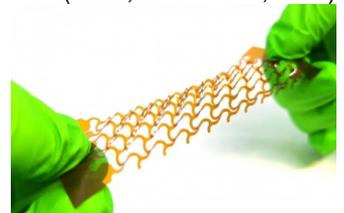


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Next-Generation Soft Hearing Implants

(EPFL, October 16, 2019)

To recover sense of hearing, electrical signals must be sent directly to the auditory brainstem. The neuroprosthetic used for this purpose is called an auditory brainstem implant (ABI). Yet the outcomes of ABIs are mixed and, in many cases, patients recover only sound perception. What's more, clinical ABIs are stiff and cannot conform precisely to the curvature of the auditory brainstem. To address this problem, a team at EPFL's Laboratory for Soft BioElectronic Interface (LSBI) worked with clinicians from Harvard Medical School and Massachusetts Eye and Ear to develop a soft electronic interface. The highly elastic implant conforms neatly to the curved surface of the auditory brainstem and can therefore send highly targeted electrical signals. This new device could replace existing auditory brainstem implants, which have a number of shortcomings.



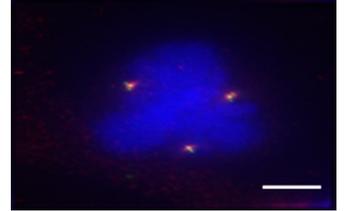
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Highly Promising Drug to Fight Cancer

(University of Geneva, October 23, 2019)

The fight against cancer involves eradicating cancer cells but current treatments inevitably have negative effects on healthy cells. Researchers from the University of Geneva (UNIGE) have now discovered a new combination of drugs that is effective in fighting cancer cells without affecting healthy cells. The researchers simultaneously tested different combinations of drugs on cancer cells and on healthy cells in vitro. This way, they discovered a highly promising mix of four components, that they named C2. The UNIGE researchers have filed a patent for the C2 combination to be used instead of the drug currently on the market and are now in the in vivo test phase on mice.



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A New Class of Antibiotics

(University of Zurich, October 23, 2019)

Many life-threatening bacteria are becoming increasingly resistant to existing antibiotics. Particularly Gram-negative bacteria that are resistant to the carbapenem and cephalosporin antibiotics, pose a growing threat to human health. Swiss researchers co-headed by the University of Zurich have discovered a new class of synthetic antibiotics that possess broad-spectrum anti-Gram-negative antimicrobial activity – a major step in the fight against antimicrobial resistance. According to the scientists, the new antibiotics interact with essential outer membrane proteins in Gram-negative bacteria, this destroys the integrity of the bacterial membranes and forces the cells to burst.



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Bacteria Use Mechanical Forces to Divide

(EPFL, October 24, 2019)

A new study from EPFL scientists has found that bacteria use mechanical forces to divide, along with biological factors. The research, led by the groups of John McKinney and Georg Fantner at EPFL, came after recent studies suggested that bacterial division is not only governed by biology, but also by physics. Before a cell divides, there is a progressive build-up of mechanical stress in the cell wall, right at the point where the cell will divide. When a bacterial cell divides the two daughters must separate, a process mediated by enzymes that dissolve the molecular connections between them. The data showed that mycobacterial cell division requires mechanical forces in addition to previously identified division molecules (enzymes).



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Using Epigenetics for Plant Breeding

(University of Zurich, October 29, 2019)

A team of researchers from the University of Zurich has been investigating epigenetic variation in plants for years. Recently they could show that epigenetic changes are subject to selection and can be passed on across multiple generations. Epigenetic variation extends conventional genetic variation, thus can be encouraged systematically. While it is less stable than a genetic modification, it occurs more frequently and thus allows rapid adaptation to changing environmental conditions. This would provide breeders with new means of adapting crops and cultivated plants to changing environmental conditions. Thanks to their discoveries, the scientists have come one step closer to their goal of assuring harvests for future generations.

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Image-guided Microwave Tumor Removal

(University of Bern, October 31, 2019)

Many liver tumors have long been difficult or impossible to remove. Since 2015, however, it has been possible to treat these tumors by combining noninvasive surgical techniques, radiological imaging and a navigation system. As the first user and co-developer of the new technique, Inselspital has now evaluated in a retrospective analysis the method's safety, therapeutic and procedural efficiency. It was able to prove that image-guided microwave tumor removal is a safe, tissue-conserving and efficient treatment for removing liver tumors. With the new system, one can even detect tumors not visible with conventional imaging and also treat areas that have remained inaccessible until now.

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Analyzing Gut Bacteria more Accurately

(EPFL, October 31, 2019)

Is there a link between the bacteria in our gastrointestinal tract and diseases such as Alzheimer's and diabetes? To better explore this possibility, multiple teams from EPFL/ School of Engineering developed a robust statistical framework that would enable the use of DNA mapping in microbiome-based diagnostics. In order to analyse involved microbiota the most common method, until now, involves looking for the genes common to all life. Another option would be for researcher to sequence everything in the sample. Both of these procedures have their drawbacks. The new method developed within the AD-gut consortium will enable researchers to identify microbial species more quickly and effectively.

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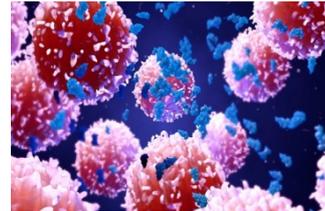


Cancer Combatting Immuno-TargET Project

(University of Zurich, November 05, 2019)

Cancer medicine is making great headway. Thanks to novel therapies that use specialized immune cells and growth factors to boost cancer patients' own immune system, some types of cancer are no longer as scary as they used to be. With its latest flagship project 2019, the University Medicine Zurich initiative now wants to promote the development of immunotherapies to combat endocrine tumors. The Immuno-TargET project, which will run for several years, brings together a number of research groups from four participating institutions, namely ETH Zurich, University Children's Hospital Zurich, University Hospital Zurich and the University of Zurich.

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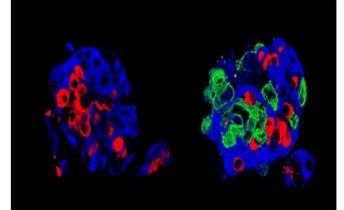




Making Pancreas Transplantation More Efficient for Patients with Diabetes

(University of Geneva, November 06, 2019)

To save patients with a severe form of type 1 diabetes, pancreatic cell transplantation is sometimes the last resort. The pancreas contains cell clusters, called islets of Langerhans, where cells that produce blood glucose regulating hormones are grouped together. However, a significant part of the grafted cells die quickly without being able to engraft. By adding amniotic epithelial cells to these cell clusters, researchers at the University of Geneva and the Geneva University Hospitals, have succeeded in creating much more robust super-islets of Langerhans. Amniotic epithelial cells have the unique characteristic of protecting the foetus from attacks by its mother's immune system. Scientists believe that the same mechanism is at work to protect the grafts.



[/web/2019/03-191106-40](#)

Gender Medicine and Drug Development

(University of Zurich, November 07, 2019)

Drugs work differently in women than in men. This can be explained by the fact that the intestinal flora influences the absorption of drugs in the intestine and that sex hormones influence how they are processed and broken down in the liver. What is more, the functioning of women's kidneys reduces more than men's with age, meaning that it takes longer for the kidneys to excrete drugs. That has consequences for women's health, as pharmaceutical drugs are most often tested on men. Specialists in gender medicine therefore want to see drug trials take into account the effects and side-effects in both sexes in the future.



[/web/2019/03-191107-99](#)

Benefits of White Noise

(University of Basel, November 11, 2019)

Researchers at the University of Basel have investigated the neuronal foundation of sound perception and sound discrimination in a challenging sound environment. The focus was on research into the auditory cortex, that is, the area of the brain that processes acoustic stimuli. The resulting activity patterns stem from measurements in a mouse brain. The researchers found that the brain's ability to distinguish subtle tone differences improved when white noise was added to the background. The findings could possibly be used in cochlear implants. They could be equipped with an effect similar to white noise in order to improve the frequency resolution and thus the hearing result of their users.

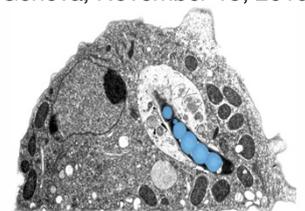


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Less Experiments on Mice

(University of Geneva, November 13, 2019)

The 3R prize, which has established itself as the international ethical standard in animal experimentation, has been awarded this autumn to a group of researchers from the University of Geneva. The 3R stands for reduce, refine and replace. Reduce the number of animals used in experiments, refine the methodology to minimize the constraints on the animal while improving the quality of the results obtained, and replace the animal model with alternative methods as soon as possible. By developing a technique to test anti-infective compounds on infected





amoebas in order to retain only the most effective ones, the research group has made it possible to considerably reduce the number of tests that have to be carried out on mice.

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Nematodes to Control Maize Pest

(University of Bern, November 15, 2019)

The western corn rootworm causes economic losses of over 2 billion US dollars in maize cultivation and is thus a serious agricultural pest. Originally from America, the western corn rootworm is currently invading Europe, including Switzerland. This maize pest can use plant defense compounds to defend itself against its own natural enemies, so-called entomopathogenic nematodes. However, the nematodes can become immune against these compounds in turn, which enhances their ability to fight the western corn rootworm, as researchers at the University of Bern show. This mechanism may contribute to improving biological pest control. In the next stage, researchers are planning to test the improved biological control agents in the field.



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First FDA approved Sickle Cell Disease Drug

(Novartis, November 15, 2019)

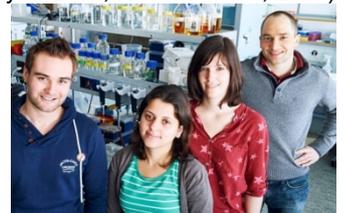
Novartis announced on November 15, 2019, that the US Food and Drug Administration (FDA) has approved Adakveo® (crizanlizumab), formerly known as SEG101, to reduce the incidence of vaso-occlusive crises (VOCs) or pain crises, in adult and pediatric patients 16 years of age and older with sickle cell disease. Adakveo is the first FDA-approved sickle cell disease drug to bind to P-selectin, a cell adhesion protein that plays a key role in the multicellular interactions that can lead to vaso-occlusion. Patients are expected to receive the drug in the coming weeks.

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New pathway to "reprogram" killer cells

(University of Bern, November 19, 2019)

Researchers at the Institute of Pathology at the University of Bern have now discovered that the mechanism by which certain immune cells kill their target cells can also be used to control the killer cells themselves. They found that the lack of TRAIL (Tumor necrosis factor-related apoptosis-inducing ligand) made the NK cells "tamer": they had reduced killer function and instead produced more messenger molecules that activate other immune cells. The results of this work may be important in the fight against cancer, since the discovered signaling pathway regulates the function of NK cells, which in turn are important for the control of tumor cells.



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Protection for pacemakers

(ETH Zurich, November 21, 2019)

ETH scientists have developed a special protective membrane made of cellulose that significantly reduces the build-up of fibrotic tissue around cardiac pacemaker implants. Their development could greatly simplify surgical procedures for patients with cardiac pacemakers, thus reduce risk of complications. The material has proved successful in animal trials, the scientists plan to apply for approval for clinical trials in humans in partnership with the ETH spin-off Hylomorph, which will be responsible for commercialisation of the membrane. The trials are slated to start next year at three large cardiac centers in Germany.



[/web/2019/03-191121-1e](#)



Dreams Prepare Us to Combat Anxiety

(University of Geneva, November 25, 2019)

Do bad dreams serve a real purpose? To answer this question, researchers analysed the dreams of a number of people and identified which areas of the brain were activated when they experienced fear in their dreams. They found that once the individuals woke up, the brain areas responsible for controlling emotions responded to fear-inducing situations much more effectively. These results, which are published in the journal *Human Brain Mapping*, demonstrate that dreams help us react better to frightening situations, thereby paving the way for new dream-based therapeutic methods for combating anxiety.

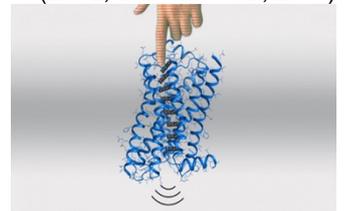


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Designing and re-purposing cell receptors

(EPFL, December 02, 2019)

The lab of Patrick Barth at EPFL's Institute of Bioengineering has developed a computational method for predicting and even designing allosteric functions in proteins. The scientists show that their method can be used for predictably designing signaling functions into receptors that belong to the large family of G protein-coupled receptors (GPCRs). They were able to engineer novel amino-acid microswitches at these sites, which can reprogram specific allosteric signaling properties. This work demonstrates the development and validation of the first computational approach that enables the prediction and rational design of protein allosteric dynamic functions. It further sets the stage for designing signaling receptors with precise functions for cell-engineering approaches and predicting the effects of genetic variations on protein functions for personalized medicine, as well as designing new allosteric proteins and better drugs from scratch.

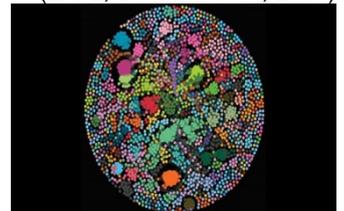


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Big Data Toolkit to mine Precision Medicine

(EPFL, December 04, 2019)

In general, most research efforts have been devoted to only a small part of the genes, neglecting the larger "dark genome". EPFL researchers now have developed Big Data tools for identifying new gene functions. As it is known that genes with similar functions tend to have similar expression patterns, the scientists used this feature to predict the function of unknown genes by learning from those of the known ones. Large-scale gene-expression datasets from six different species were collected. They then used these to develop a toolkit termed "GeneBridge" that can identify potential gene functions. The toolkit was then used to identify novel functions of genes, many of which have been verified by Auwerx's group as well as by other research groups.



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4. Nano / Micro Technology / Material Science

Superconducting Fermion Metal

EPFL's Laboratory of Quantum Materials (QMAT), headed by Philip Moll, has been working on a specific group of unconventional superconductors known as heavy fermion materials. The QMAT scientists, made a surprising discovery about the fermion metal CeIrIn5. CeIrIn5 superconducts at a very low temperature, only 0.4°C above absolute zero (around -273°C). The scientists have shown that this material could be produced with superconducting regions coexisting alongside regions in a normal metallic state. Additionally, they produced a model that allows researchers to design complex conducting patterns and, by varying the temperature, to distribute them within the material in a highly controlled way. This new approach allows researchers to "draw" superconducting circuitry on a single crystal bar, a step that paves the way for new quantum technologies.

[/web/2019/04-191011-64](#)

(EPFL, October 11, 2019)



High-Precision Instrument for Ophthalmologists

On EPFL Neuchâtel's research day on September 11, 2019, a research team presented a groundbreaking device for eye surgery. SPOT-RVC is a high-precision, miniaturized medical device made entirely of glass. It is only 6 cm long and 1 mm thick, contains a tiny flow channel no wider than a hair strand and a sophisticated mechanism of flexible blades. The device allows physicians to inject drugs directly into a patient's retinal veins - something that has never been possible before. The device is currently still in the prototype phase. "We got good results from our in vitro and in vivo tests," explained Dr. Charles Baur, a senior scientist at Instant-Lab. "Now it is necessary to conduct preclinical trials and obtain the necessary certifications. Then we'll move on to the production stage, which will require a fairly large investment from the industrial partner. We genuinely hope that one day the device will become a useful tool for eye surgeons."

[/web/2019/04-191019-81](#)

(EPFL, October 19, 2019)



Magnesium Orthopaedic Screws

Magnesium orthopaedic screws, which dissolve over time in the body, spare patients another operation after healing is completed and reduce the risk of infection. What happens inside the body during this process, though, is still largely unknown. To develop optimized alloys and orthopaedic screws with functionalized surfaces, Empa researchers are now investigating magnesium corrosion. They are using specially developed analytical methods to depict bio-corrosion, in the body under conditions that are as realistic as possible. The goal is to find optimal alloys of magnesium and biocompatible elements as well as new surface properties for resorbable magnesium screws.

[/web/2019/04-191105-53](#)

(EMPA, November 05, 2019)





High-Tech Wood Material

The wood material developed by Marion Frey, Tobias Keplinger and Ingo Burgert at Empa and ETH Zurich has the potential to become a high-tech material. Their aim is to improve the natural properties of wood and equip it with new functions that will broaden the application range for wood. In the process, the researchers remove precisely the part of the wood that gives it its stability in nature: lignin. The result: The wood can easily be brought into any shape when wet. When the delignified wood is dried, the cells interlock – which in turn leads to stable compounds. Besides the deformability, there is another effect: It leads to a higher porosity. It is easier to introduce other substances into the wood structure. The researchers see possible applications of their new material in the automotive, aviation and furniture industries.

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(EMPA, November 11, 2019)



Reinforcing Concrete Structures More Sustainably

The construction industry produces around 40% of global CO2 emissions, mainly from manufacturing concrete. Many countries with abundant concrete structures now face the daunting task of maintaining them to ensure they remain safe far into the future. Over the last 25 years, EPFL's Structural Maintenance and Safety Laboratory (MCS) has built up cutting-edge expertise in this field, specializing in developing more eco-friendly concrete, and undertaking sophisticated, largely monitoring-based, assessments of existing structures like road and rail bridges. MCS has just created the next generation of ultra-high-performance fiber-reinforced concrete (UHPFRC), useful for strengthening and extending the lifespan of both old and new structures. This new material is 10% lighter than the previous generation of fiber-reinforced concrete and its manufacturing process releases 60–70% less CO2.

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(EPFL, November 13, 2019)



Glass produced by 3D printer

ETH researchers have produced complex and highly porous glass objects using a 3D printing process. A special resin, which is cured with UV light, forms the basis for this process. The production of glass objects in 3D printing is not easy. Only a few research groups around the world have attempted to produce glass using additive methods. Researchers at ETH Zurich have now used a new technology to produce complex glass objects using 3D printing. The process is based on stereolithography, one of the first 3D printing techniques developed in the 1980s. David Moore, Lorenzo Barbera and Kunal Masania in the Complex Materials group led by ETH professor André Studart have developed a special resin containing plastic and organic molecules to which glass precursors are bound.

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(ETH Zurich, November 26, 2019)



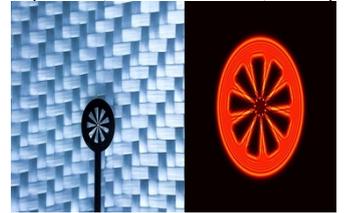


Terahertz Radiation allows unobstructed View of Hidden Objects

Empa researchers are developing new methods that allow a close look at a wound, without having to remove the dressing, so that the unobstructed view of hidden objects can also be used in biomedicine. For this terahertz radiation in the wavelength range from 0.1 to 1 millimeter is used. The waves range between warming infrared and radio waves and are not harmful to a person's health. Terahertz rays is completely transparent for a large number of materials such as textiles, plastics, paper and wood. Therefore, this allows non-contact inspections. Further development of terahertz technology can in future be used, for example, for the gentle observation of wounds that are securely wrapped in a dressing.

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(EMPA, November 26, 2019)



Matrix Systems with Auxetic Properties

Empa researchers at the Biomimetic Membranes and Textiles lab in St. Gallen have developed novel matrix systems with auxetic properties. By electrospinning, dissolved polymers are spun as wafer-thin filaments in a form similar to the human extracellular matrix. This makes it possible to produce multi-layer membranes from nanofibers that are biocompatible and can be implanted into the human body. Electro-spun membranes are suitable for the treatment of wounds and tissue damage in locations as diverse as on the skin, in blood vessels and in internal organs or even in bone injuries.

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(EMPA, December 03, 2019)



5. Information & Communications Technology

Smartphone Typing Speeds Approaching Keyboard Typing Speed

(ETH Zurich, October 02, 2019)

A study of over 37,000 users shows that the difference typing speeds between mobile devices and physical keyboards is decreasing, and 10–19-year olds can type about 10 words-per-minute faster than their parents' generation. The participants reported spending an average of six hours per day on their mobile devices. The study observed that users typing with two thumbs achieved 38 words per minute on average, which is only about 25% slower than the typing speeds observed in a similar large-scale study of physical keyboards. The best predictor of performance is whether one finger or two thumbs are used to type. Over 74% of people type with two thumbs, and the speed increase it offers is significant.

[/web/2019/05-191002-64](#)

Smart Speaker Helps Care for the Elderly at Home

(EPFL, October 14, 2019)

Two students from EPFL have developed a smart speaker with voice-activation technology, called Ouay, that connects patients directly to their loved ones as well as to caregivers and emergency services. The system is designed to save time and provide greater peace of mind to the elderly or disabled. By providing an easy, reliable connection, it allows patients to remain independent while reassuring everyone involved that help is never far away. The entrepreneurial duo fleshed out their idea at the Zurich hackathon, a weekend-long brainstorming marathon, tested their idea with local caregivers and patients in order to pinpoint their needs, and teamed





up with other students from EPFL, HEC and HE-ARC to make prototypes. Ouay is currently being tested by several home-care service providers.

[/web/2019/05-191014-e8](#)

GPS Data from Smartphones Can Be Vital in Preventing the Spread of Infectious Diseases

(EPFL, November 15, 2019)

Researchers from EPFL and MIT have shown that human mobility is a major factor in the spread of vector-borne diseases such as malaria and dengue even over short intra-city distances. The authors studied the interplay between human mobility and the 2013 and 2014 dengue outbreaks in Singapore. They found that even low levels of mobility can cause the epidemic to spread, underscoring the need for an effective spatial distribution model. The researchers demonstrated that the mobile phone data and census models were effective at predicting the spatial distribution of dengue cases in Singapore, and that such data could be obtained without infringing on people's privacy. Their findings invite further discussion about the merits and drawbacks of using mobile phone data to model disease outbreaks, as well as other potential applications.



[/web/2019/05-191115-ce](#)

Built-in Expiration Date for Electronic Devices

(EMPA, November 28, 2019)

Whether mobile phones or automatic toilets - electronic devices are getting more and more complex. And who doesn't know the stories of devices that fail just after the warranty period? According to Empa researcher Peter Jacob, however, the shorter lifespan is not a malicious "planned obsolescence" but is primarily due to the enormous cost pressure. Internal cost targets are often very strict, especially for large quantities. Cost pressure is huge - and is passed on along the supply chain. These are often lengthy and complicated.

[/web/2019/05-191128-f4](#)

Smartphone Identity Verification

(ETH Zurich, November 28, 2019)

Anyone who wants to open a bank account or buy a mobile phone plan has to identify themselves to the respective service provider. The ETH spin-off PXL Vision, founded by young Zurich entrepreneurs, has a simpler solution: just use an ID scan and a selfie video. Within seconds, the system confirms whether the scanned document and the video are authentic. With this fully automated method, customers can immediately purchase a mobile phone subscription or set up a bank account from anywhere and at any time. The technology, called Daego (a mash-up of "digital alter ego"), supports all international travel documents as well as other forms of ID. This automated solution, is faster, more precise, more affordable, and more secure than having people do the verification.



[/web/2019/05-191128-2e](#)



6. Energy / Environment

Reducing Transport's Impact with Smart Carbon Taxes

(EPFL, October 03, 2019)

Swiss transport is the country's leading CO₂ emitter, producing 41% of total emissions – a higher proportion than in the European Union (28%) and the USA (34%). Road traffic produces most of these emissions (98%), and the country's large number of 4x4 vehicles – around 40% of new vehicle registrations compared with an EU average of 13% – is a major contributor. Strategies for reducing vehicle emissions are urgent, as road traffic is expected to rise steadily unless tough political decisions are made. Using macroeconomic modeling, EPFL researchers have identified the most effective carbon tax for Switzerland to meet the Paris Agreement targets: a uniform levy on gasoline, diesel fuel and heating oil, rising to CHF 1.70 per liter by 2050. The study is published in the Swiss Journal of Economics.



</web/2019/06-191003-ba>

Biodiversity in Agriculture

(University of Zurich, October 15, 2019)

Environmental scientist Bernhard Schmid makes a parallel comparison between nature and human society to showcase the importance of biodiversity: just like how in a society, we have clear divisions of labor to make sure operations are running as smoothly as possible. Nature requires a bundle of species for different tasks. Bernhard Schmid further elaborates on his experiments where he reduced the number of plant species in an ecosystem step by step until just one remained. The results clearly showed that as biodiversity declined, the system became increasingly unproductive and also lost dependent plant and insect species. Therefore, Bernhard Schmid advocates that today's agriculture industry should gradually shift its focus from optimizing for productivity and yields to improving biodiversity.



</web/2019/06-191015-09>

Nitrous Oxide Emissions Rising in the Pacific Ocean

(EPFL, November 11, 2019)

A study carried out jointly by scientists at EPFL, the Tokyo Institute of Technology and the Japan Agency for Marine-Earth Science and Technology shows that the acidification of the Pacific Ocean in northern Japan is increasing the natural production rate of N₂O. The effect of this ozone-depleting greenhouse gas is 298 times greater than that of CO₂. Today's rising CO₂ emissions are changing oceans' pH levels, making them more acidic. The harmful effects are visible in the coral reefs. Yet other chemical processes, whose environmental impact is not fully known, are also being affected. The study – recently published in Nature Climate Change – provides additional proof that rising CO₂ emissions are disrupting natural biogeochemical cycles, which are highly sensitive to changes in the environment.



</web/2019/06-191111-81>



Plankton Biodiversity and Activity Higher in Warm Oceans

(ETH Zurich, November 14, 2019)

The ocean is the only continuous ecosystem on the planet. Countless viruses, microbes, unicellular plants and animals and tiny, multicellular animals – known collectively as plankton – drift freely with the ocean currents. Plankton has crucial functions. It forms the basis of all marine food webs, and photosynthetically active plankton constituents produce enormous amounts of oxygen and simultaneously capture a large fraction of the atmospheric carbon dioxide. In two new studies, an international research consortium, including the Microbiome Research group of the ETH Zurich, shows where the main groups of planktonic organisms are found and how they adjust to the environmental conditions in their respective marine areas. The analyses demonstrate that planktonic microbial communities in warm waters have a greater variety of species and a larger gene pool than their counterparts in colder waters. They also show that although plankton lives in a continuous ecosystem, it is unevenly distributed. The highest biodiversity can be found in non-polar seas, and variety decreases towards the poles.

[/web/2019/06-191114-53](#)



Micro-Rubber in the Environment

(EMPA, November 14, 2019)

Everybody is talking about microplastics. But the amount of micro plastics in air and water is small compared to another polymer that pollutes our air and water - and therefore our organism: Micro rubber! The lost centimetres of tyre tread, mainly end up in soil and water and, to a small extent, in the air. Empa researches have calculated the amount of these particles in our environment, showing that over the last 30 years, from 1988 to 2018, around 200,000 tonnes of micro rubber have accumulated in our environment in Switzerland. Whereas car and truck tyres are the main source of micro-rubber.

[/web/2019/06-191114-77](#)



High Performance Solar Cooker

(EPFL, November 15, 2019)

EPFL scientists have developed a glass-paneled solar cooker that delivers exceptional performance. Their patented design can operate an average of 155 days a year in Switzerland's cloudiest regions and up to 240 days in its sunniest. Today the scientists are working on further increasing their cooker's efficiency and on making it a "smart cooker" by incorporating an app that would let users monitor the oven when they're not at home and that would send an alert when a meal is ready.

[/web/2019/06-191115-bc](#)



Floating Solar Panels in the Alps

(Romande Energie, November 18, 2019)

Romande Energie is deploying a 448 kW floating array on the surface of Lac des Toules, a reservoir located at an altitude of 1,810 meters in the Swiss Alps. They claimed that such systems can reduce seasonal reductions in power generation during the winter due to fog, clouds and lower solar radiation. The installation will likely operate under heavy weather conditions, but it is also expected to produce 50% more power than similar projects built in the plain.

[/web/2019/06-191118-39](#)





Melting Swiss glaciers to Fuel Conflicts over Water

(swissinfo.ch, November 19, 2019)

The ice covering the surface of the Swiss mountain region will continue to provide enough water throughout the year but one day, it will probably dry up altogether during the summer months. But Switzerland will never face a shortage of drinking water if there are no more glaciers. A major problem is a foreseeable conflict of interest between the agricultural sector and the hydropower plants – in other words, between those who want to use water from a river at the bottom of a valley to irrigate the fields during dry spells and those who want to store the water in reservoirs in the mountains to produce electricity to cover the peak demand during the winter. It is also foreseeable that the smaller amount of melting water will make these major European streams less suited for river vessels, concludes Huss.



[/web/2019/06-191119-d8](#)

When Grown Right, Palm Oil can be Sustainable

(EPFL, November 20, 2019)

Scientists from EPFL and the Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) have long been studying soils in oil-palm plantations to identify more sustainable cultivation methods. Palm-oil production is criticized by environmentalists because of its large carbon footprint and negative impact on biodiversity. In large-scale producers like Indonesia and Malaysia, it has caused large-scale deforestation, reducing biodiversity and releasing significant amounts of CO₂. However, the findings of an EPFL-WSL study, published in *Science Advances*, indicate there may be sustainable alternatives to deforestation for palm-oil production. For example, the main palm oil producing countries have large abandoned pastures that could be converted favorably. Planting dense populations of oil palm trees there would increase the carbon capture rate per unit of surface area, thus limiting deforestation-induced carbon loss.



[/web/2019/06-191120-21](#)

7. Engineering / Robotics / Space

Using Deep Learning to Design Fly-like Robots

(EPFL, October 11, 2019)

Scientists at EPFL's Institute for Computer Science have developed DeepFly3D, a deep-learning based motion-capture software that uses multiple camera views to model a fly's poses and movements in three dimensions. Flies have features and abilities that are useful in designing robotic systems – for example, thanks to adhesive pads and claws on their feet, they can climb across challenging terrain like walls and ceilings that a wheeled robot cannot. Being able to rest on any surface and wait for the right moment to act enables efficient energy use. Leveraging computer science and neuroscience to gain insights into how flies (or other organisms) move can facilitate rapid advances in robotics and medicine. The ultimate aim is to use this knowledge to design fly-like robots.



[/web/2019/07-191011-10](#)



Predicting Where and When Lightning will Strike Using AI

Lightning is one of nature's most unpredictable phenomena, regularly killing people and animals and setting fire to homes and forests. It keeps aircraft grounded and damages power lines, wind turbines and solar-panel installations. However, little is known about what triggers lightning, and there is no simple technology for predicting when and where it will strike. Researchers in the Electromagnetic Compatibility Laboratory of EPFL's School of Engineering have developed a novel, inexpensive way of predicting lightning strikes to the nearest 10-30 minutes and within a 30-kilometer radius. The system uses a combination of standard data from weather stations and artificial intelligence, and it is planned to use it in the European Laser Lightning Rod project. The research findings are published in *Climate and Atmospheric Science*, a Nature partner journal.

[/web/2019/07-191108-c4](#)

(EPFL, November 08, 2019)

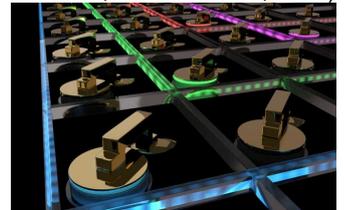


Smaller, Faster Electro-Opto-Mechanical Light Switch Developed

Switching light beams quickly is important in many technological applications. Researchers at ETH have now developed an electro-opto-mechanical switch for light beams that is considerably smaller and faster than current models. This is relevant for applications such as self-driving cars and optical quantum technologies. To achieve this, the researchers used so-called plasmonics. In this technology, light waves are squeezed into structures that are much smaller than the wavelength of the light – which, according to the laws of optics, should be impossible to do. So far, however, real-life commercial applications have failed because of the large losses encountered when transporting photons through plasmonic devices, and because of the high switching voltages needed. The researchers have now solved those problems by exploiting the good properties of plasmonics while minimizing the bad ones. Thus, their new switch can be flicked on and off several million times per second with an electric voltage of little more than one volt.

[/web/2019/07-191115-d1](#)

(ETH Zurich, November 15, 2019)



Eye-Tracking Software for Pilot Training

In collaboration with Swiss International Air Lines, NASA and other partners, researchers at ETH Zurich have developed an eye-tracking software for pilot training. This enables instructors to analyze the gaze behavior of student pilots in the cockpit. Known as the "iAssyst" ("Instructor Assistant System"), the program integrates video, audio and simulator recordings while simultaneously displaying the pilots' gaze patterns. In order not to distract the pilots, an eye-tracking system comprising fixed cameras and infrared sensors was installed specifically in the cockpit of an A320 flight simulator.

[/web/2019/07-191125-b6](#)

(ETH Zurich, November 25, 2019)



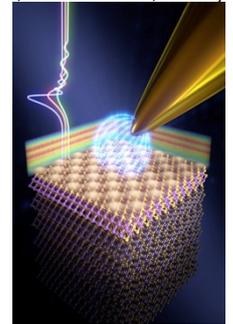


8. Physics / Chemistry / Maths

Friction Control in Topological Insulators

(University of Basel, October 14, 2019)

Topological insulators are innovative materials that conduct electricity on the surface, but act as insulators on the inside. Physicists at the University of Basel and the Istanbul Technical University have begun investigating how they react to friction. Their experiment shows that the heat generated through friction is significantly lower than in conventional materials. This is due to a new quantum mechanism. Thanks to their unique electrical properties, topological insulators promise many innovations in the electronics and computer industries, as well as in the development of quantum computers. The thin surface layer can conduct electricity almost without resistance, resulting in less heat than traditional materials. This makes them of particular interest for electronic components. Furthermore, in topological insulators, the electronic friction can be reduced and controlled. Researchers of the University of Basel, the Swiss Nanoscience Institute (SNI) and the Istanbul Technical University have now been able to experimentally verify and demonstrate exactly how the transition from energy to heat through friction behaves.

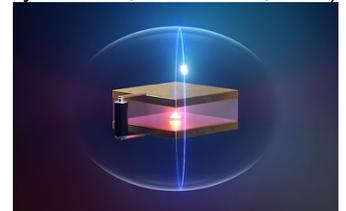


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Strong Interaction between Light and Matter Using a Cavity

(University of Basel, October 21, 2019)

Researchers have succeeded in creating an efficient quantum-mechanical light-matter interface using a microscopic cavity. Within this cavity, a single photon is emitted and absorbed up to 10 times by an artificial atom. This opens up new prospects for quantum technology. The successful experiment is particularly significant because there are no direct photon-photon interactions in nature. However, a controlled interaction is required for use in quantum information processing. By transforming light into matter according to the laws of quantum physics, an interaction between individual photons becomes indirectly possible. If several such photons are involved, quantum gates can be created through entangled photons. This is a vital step in the generation of photonic qubits, which can store information by means of the quantum state of light particles and transmit them over long distances.

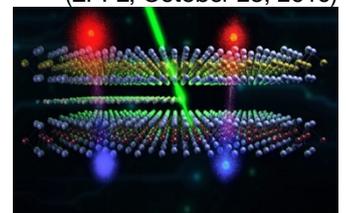


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Excitons to boost Efficiency of Electronic Devices

(EPFL, October 23, 2019)

Excitons are quasiparticles made from the excited state of electrons. According to Scientists at EPFL excitons have the potential to boost the energy efficiency of our everyday devices. The researchers studied the extraordinary properties of excitons and found a way to better control excitons moving in semiconductors. Additionally, they also discovered a way to polarize the exciton currents, this means that the quasiparticles could eventually be used to encode data independently through variations in current magnitude as well as its polarization.



[/web/2019/08-191023-6b](#)

Information Processing of Cancer Cells

(University of Geneva, October 29, 2019)

In the late 1940s, American mathematician Claude Shannon developed a probabilistic theory to quantify the information transmitted in a set of messages over a noisy communication channel. This theory has enabled the development of modern communication systems and computers. Applied to cell signalling, information theory allows studying how cells process the information they receive from their environment. Using this information, the researchers aim to better understand the cancerous development of cells and propose innovative therapeutic strategies. The validity of this approach will be tested by studying how breast and lung cancer cells process information from their environment.

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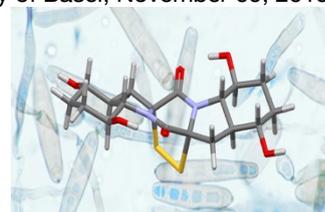


Successful Synthesis of Epicoccin G and Rostratin a Using C-H Bond Activation

(University of Basel, November 09, 2019)

Certain microorganisms, such as fungi, are a rich source of secondary metabolites, which have great potential in medicinal applications. Of particular interest among these secondary metabolites are the dithiodiketopiperazines (DTPs). Chemists from the University of Basel have succeeded in synthesizing Epicoccin G and Rostratin A from the group of dithiodiketopiperazines. For this, they employed a new strategy based on C-H bond activation, resulting in a short and high yielding route.

[/web/2019/08-191109-f1](#)



New Research on Dark Matter and Antimatter

(CERN, November 13, 2019)

The new measurements by the BASE collaboration, which teamed up with researchers from the Helmholtz Institute Mainz, provide a novel way to probe dark matter and its possible interaction with antimatter. While relying on specific assumptions about the nature of dark matter and on the pattern of the matter–antimatter asymmetry, the experiment's results are a unique probe of unexpected new phenomena, which could unveil extraordinary modifications to our established understanding of how the universe works.

[/web/2019/08-191113-c3](#)





9. Architecture / Design

Carbon-Fiber in place of Steel Rods

The project began four years ago as part of “Design Together,” an interdisciplinary teaching initiative at EPFL’s School of Architecture, Civil and Environmental Engineering (ENAC). At this year’s workshop, 26 architecture and civil engineering students from EPFL and Brazil’s Federal University of Bahia spent 14 days at the Smart Living Lab in Fribourg. The students built a prototype modular structure from textile-reinforced concrete, a material that uses carbon fiber in place of steel rods, plus purpose-built metal formwork. The pavilion is far thinner and lighter than similar conventional reinforced concrete structures without compromising on static resistance. The usage of far fewer materials than traditional methods and its compatibility with low-carbon cement, results in sharply lower CO2 emissions. Ultimately, the new material could allow more people to self-build simple, weather-resistant homes without the need for heavy construction machinery.

[/web/2019/09-191016-31](#)

(EPFL, October 16, 2019)



10. Economy, Social Sciences & Humanities

Switzerland Ranked 2nd Most Competitive Country in Europe

(University of St.Gallen, October 09, 2019)

The World Economic Forum (WEF) has published the 2019 Global Competitiveness Report. In the Global Competitiveness Index 4.0 comprising the most competitive countries in the world, Switzerland is ranked 5th behind Singapore, the USA, Hong Kong and the Netherlands. This year the report has been redesigned and reviewed against the background of the fourth industrial revolution. In the future, competitiveness will mainly be determined by factors such as the spirit of innovation, corporate culture, openness and agility. Up until 2017 - before the restructuring of the Index’ - Switzerland had defended first place for nine years in a row as the most competitive country in the world.

[/web/2019/10-191009-81](#)

Call for Sustainable Investing

(University of Zurich, October 14, 2019)

The economics professor, Marc Chesney, criticizes the pursuit of economic growth and calls for banks to stop investing in fossil fuels. According to him, constant growth isn’t a realistic goal and is not a law of nature. We should have a new way of thinking; some ideas should be challenged like “more” should not always be presented as synonymous with “better”. Growth not only requires an unsustainable accumulation of debt but is also harmful to the environment. For him, we have to develop and buy products that are sustainable and banks, too, should make sustainable investments. Our current pursuit of economic growth comes at the expense of future generations, and that’s just selfish. As stated by Marc Chesney, we should forget about the “more” and focus instead on what’s “necessary” to lead a decent life.

[/web/2019/10-191014-93](#)





Monkeys Can Learn New Dialect

(University of Zurich, October 23, 2019)

Human beings aren't the only species that have dialects. The common marmoset is one such animal that communicates using regional dialects. Researchers at the University of Zurich have now found out that they even adapt their dialect when they move to a different area. The researchers analyzed the calls of common marmosets before and after they moved to a new colony with a different dialect. After a short time, the newcomers adapted their calls to the new dialect, thus dialect are socially learned. While marmosets are not quite as closely related to humans as great apes, they are more similar to us in some respects. This study and others show that the common marmoset is an important model system to understand the origins of language.



[/web/2019/10-191023-3a](#)

Boys and Girls with Conduct Disorder

(University of Zurich, November 06, 2019)

Severe emotional disturbances have mainly been associated with violent young men until now. But girls can also display anti-social behavior. FemNAT-CD, the wide-scale European research project with the aim of identifying the causes of sex-specific differences in the diagnosis of conduct disorder, started in 2013. From Switzerland, the Universities of Basel and Zurich were involved in the project. By conducting MRI tests on children, researchers managed to show that in girls with a conduct disorder, not only the brain structure but also the brain functioning and the connections between specific brain regions are altered. A follow-up study is now planned to find out whether boys and girls with the same diagnosis have similarities in terms of emotion regulation or not.



[/web/2019/10-191106-47](#)

Rising Life Expectancy, Widening Inequalities

(University of Geneva, November 11, 2019)

Life expectancy in Switzerland has been growing steadily for decades. But have these additional years been spent in good health or, on the contrary, do they only prolong the ills of an aging population? In an attempt to answer this question, researchers from the University of Geneva (UNIGE), Switzerland, collated data from the Swiss National Cohort (SNC) and the Swiss Health Surveys between 1990 and 2015, all within the framework of the "LIVES" National Centre of Competence in Research (NCCR LIVES). The results show that although the life expectancy of the Swiss population as a whole is growing, people who only attended compulsory schooling are living longer in poor health.



[/web/2019/10-191111-17](#)

Life after 40 with Hormonal and Psychological Changes

(University of Zurich, November 13, 2019)

Occurring in both men and women, hormonal change could cause sleep disorders, hot flashes or night sweats. Moreover, middle-aged people have to deal with many more stressful situations — relationships break up, divorce rates rise, and death of others. In this article, psychologists Hannah Süss and Jasmine Willi not only talk about how changes in our body and mind will influence our middle-age life, but also give advice on how we can approach and deal with such predictable changes.



[/web/2019/10-191113-64](#)



Four Factors Determine Road Network Traffic Capacity in Cities

(ETH Zurich, November 19, 2019)

The number of vehicles a road network can support differs from city to city, and the factors that influence these differing traffic capacities were previously unquantified. ETH researchers have now used billions of traffic measurements to reveal a set of rules that enable us to easily estimate the critical number of vehicles, and by extension, the traffic capacity of a city's road network. As a result, they discovered that certain topological features relating to the road system and bus network could explain around 90 percent of the differences in traffic capacity. The researchers identified four factors that shape a city's road network and define its traffic capacity: the road network density, the redundancy of the network in providing alternative routes for getting to a particular destination. The frequency of traffic lights also had an impact, as did the density of bus and tram lines.



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Stable coasts for Inpatient Hospital Care

(Admin.ch, November 21, 2019)

In 2018, one million people received inpatient care in a Swiss hospital or birthing centre. This represents 12% of the entire Swiss population and shows a slight decline in comparison with the previous year. Because some patients that got treated multiple times the number of inpatient hospital stays was 1.47 million. Hospitals' inpatient costs have stood still for the second year running. At 3%, the rise in costs for outpatient care was more moderate in 2018 than in recent years. These are some of the results from the Hospital Statistics from the Federal Statistical Office (FSO).

[/web/2019/10-191121-2a](#)

Pharmaceuticals and Energy strengthen GDP Growth

(Admin.ch, November 28, 2019)

Switzerland's GDP grew by 0.4% in the third quarter of 2019, after rising by 0.3% in the previous quarter. Exports of chemical and pharmaceutical products and energy contributed significantly to this increase. In other areas, the effects of the subdued international environment were felt more acutely. Overall, the economy is showing signs of weakening. Data and further information can also be found here: www.seco.admin.ch/gdp.

[/web/2019/10-191128-f4](#)

11. Startups / Technology Transfer / IPR / Patents

AI-Designed Bike Breaks World Speed Records

(EPFL, October 10, 2019)

An aerodynamic bike designed using software from Neural Concept – a spin-off from EPFL's Computer Vision Laboratory – has broken two world records for cycling speed. At the 2019 World Human Powered Speed Challenge held in Nevada in September, pilot Ilona Peltier bicycled down a 200-meter track at 126.5 km/h, setting a new world record for women's cycling speed across all categories. Her teammate Fabian Canal set a new men's university world record at 136.7 km/h. Peltier and Canal rode the pod-like Altaïr bike – housing two wheels and pedaled by a reclining pilot – that can travel faster than many motor-driven vehicles thanks to an optimized, aerodynamic shape proposed by Neural Concept's AI-driven computer program. This novel technology accelerates simulation processes, allowing companies to increase efficiency and decrease costs.



[/web/2019/11-191010-7b](#)



Startup GTX medical moves to the US

GTX medical, an EPFL spin-off that has developed an implantable neuromodulation therapy to help people with spinal cord injuries walk again, has merged with NeuroRecovery Technologies, a US-based company developing a transcutaneous stimulation therapy to improve upper limb function after a spinal-cord injury. The combined entity – which retains the name GTX medical and has premises at EPFL's Innovation Park as well as in Eindhoven (Netherlands) and the USA – is set to become the global leader in its niche. It plans to build close ties with university laboratories, like its partner EPFL's Courtine Lab, as it looks to develop new rehabilitation therapies that harness the latest advances in scientific research. It will continue developing the complementary therapies of transcutaneous spinal-cord stimulation devices and epidural implants in parallel.

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(EPFL, October 22, 2019)



Intelligent Network for Better Water Management

EPFL-based startup Droople has developed a smart flow meter that can measure buildings' water consumption and identify potential energy savings. The meters record not just water flow rates and temperatures, but also peak usage times and total consumption – valuable data for facilities managers or operators of heating and sanitary systems seeking to cut costs. The system comprises a series of meters installed at the point of use that collect data and send them through a low-power wide-area network to a cloud-based software program. The EPFL's Montreux Jazz Café has already tested the device on its refrigeration compressors and found a way to cut its energy bill by installing a heat recovery system that would recover around 4,800 kWh a year and pay for itself in around 2.5 years.

</web/2019/11-191104-bf>

(EPFL, November 04, 2019)



Startup Artidis Joins World's Largest Medical Center

Artidis, which is a spin off from the University of Basel, announced its successful integration in the international Medical Device Cohort 2019 at the Texas Medical Center's Innovation Institute. Artidis is developing a medical device based on nanotechnology for clinical application in cancer diagnostics. The Texas Medical Center (TMC) is considered the world's largest medical center and has first-class capacities in the life sciences. The TMC Innovation Accelerator is a program that aims at impacting the healthcare industry by fostering integration of cutting-edge technology in the clinics. Artidis is one of the 16 startups selected worldwide from more than 140 competing healthcare companies for the 9th TMC accelerator medical device cohort.

</web/2019/11-191119-5a>

(University of Basel, November 19, 2019)





12. General Interest

Multimodal Commuter Practices

Why do some people cycle instead of taking the bus? Why do others drive rather than traveling by train? Two factors – price and journey time – have long determined how commuters choose to get to work. The survey shows a general declining attitude towards driving over time. Further, the findings also highlighted the extent to which commuters – most of whom now have smartphones and other internet-enabled devices – are keen to make the most of their journey time. The research provides detailed insights into the transport habits of the area's workers, breaking down the findings according to people's place of residence, age, educational attainment, and more.

</web/2019/12-191009-60>

(EPFL, October 09, 2019)



How the Human Brain Development Diverged from Great Apes

Researchers from the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany, the Institute of Molecular and Clinical Ophthalmology Basel (IOB), and the D-BSSE present new insights into the development of the human brain and differences in this process compared to other great apes. The study reveals features of brain development that are unique to humans and outlines how these processes have diverged from those in other primates.

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(ETH Zurich, October 16, 2019)



New Proteins from Pasta, Bread and Beer

A key aim of the project is to help build a future-proof protein supply by creating sustainable and nutritious alternative proteins. This is in direct response to some of the most urgent challenges faced by the planet, including climate change. A range of groundbreaking new-protein foods made from the byproducts of pasta, bread and beer will soon be created under a revolutionary new EU project. The project is called Smart Protein and is funded by the European Commission. It is expected that the first wave of products will go to market in or around 2025. Pasta residues, bread crusts and spent yeast and malting rootlets from beer production will be reintegrated into the food stream using an upcycling process. A total of 33 partners from industry, research and academia across 21 different countries, including Life Technologies Institute of the HES-SO Valais-Wallis, will collaborate on this project.

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(Switzerland Innovation, November 05, 2019)



13. Calls for Grants/Awards

Awarded for his Real-world Teaching Strategy

Dominique Pioletti, an associate professor who heads up EPFL's Laboratory of Biomechanical Orthopedics, has won the Credit Suisse Award for Best Teaching 2019 in recognition of his project-based model, the implementation of new lab sessions, and the overall standard of his teaching. Last year, he introduced an innovative new practical element to his Master's-level class on the biomechanics of the musculoskeletal system. Students spent 14 weeks, in groups of four or five, dealing firsthand with real-life clinical problems encountered by doctors in Lausanne, Geneva, Bern and Zurich. For Pioletti, there is no substitute for the hands-on application of classroom learning. He believes the projects force students to apply their knowledge within real-world constraints, and to interact with people from different disciplines, preparing them for working life.

[/web/2019/13-191004-42](#)

(EPFL, October 04, 2019)



Prix Zonta Award ETH Zurich and EPFL

Simone Schürle-Finke, Professor of Reactive Biomedical Systems at ETH Zurich, together with Andrea Ablasser, a physician from EPFL, has been awarded the Prix Zonta 2019 by the Swiss Zonta Clubs in recognition of their achievements in the field of science and technology. The researchers work on developing tiny machines in the micro- or nanometer range for medical applications in the human body. For example, these systems could react to altered pH values or certain enzymatic activities and communicate this information externally to help in diagnostics. Or they could be used as vehicles to transport active substances into the tissue where they are needed.

[/web/2019/13-191022-de](#)

(ETH Zurich, October 22, 2019)



Heinz Hopf Prize awarded to Model Theorist Ehud Hrushovski

Ehud Hrushovski was awarded the 2019 Heinz Hopf Prize. With the award, ETH Zurich honours the contributions of the Oxford mathematician to model theory – both to developing the subject, and to applying it to diverse areas of mathematics. Model theory is a relatively young subject. It has been developed systematically since the early 1950s. In the course of his career, Hrushovski has made substantial contributions to both aspects, developing model theory as a subject and applying its tools to classical problems in various fields of mathematics. Among his most important contributions are the 1988 construction of a new strongly minimal set disproving a 1984 conjecture of Boris Zilber, and his work with Zilber on Zariski geometries and his proof of the Mordell-Lang conjecture for function fields in 1996, his work with Zoé Chatzidakis on the model theory of difference fields and a new proof of the Manin-Mumford conjecture in 2001, his work with Ya'acov Peterzil and Anand Pillay on NIP ("not the independence property") structures, and his 2012 paper on approximate subgroups.

[/web/2019/13-191023-7a](#)

(ETH Zurich, October 23, 2019)





EPFL Bioengineering Team wins Global iGEM Competition

EPFL's student bioengineering team project ViTEST, is a diagnostic test for grapevine disease that currently plague European winegrowers. ViTEST offers a proof-of-concept solution: a rapid and easy-to-use test that can be performed in under two hours in the field and without needing laboratory equipment or special training. With ViTest, farmers can detect deadly plant diseases more easily and prevent loss of crops while cutting down on pesticides, and ensuring a sustainable future. With this project the EPFL team has won the Grand Prize of the 2019 International Genetically Engineered Machine (iGEM) competition, as well as the Best Environment Project. The iGEM is a worldwide synthetic biology competition in which hundreds of high school and university teams compete with original projects that they developed at their home institutions. [/web/2019/13-191105-f7](#)

(EPFL, November 05, 2019)



Infosys Prize Awarded to ETH Zurich Professor of Applied Mathematics

The Infosys Science Foundation awarded the 2019 Infosys Prize for Mathematical Sciences to Professor Siddhartha Mishra. He received the prize for his outstanding contributions to applied mathematics, particularly for designing numerical tools for solving problems in the real world. Sid Mishra's work has been used in climate models, in astrophysics, aerodynamics, and plasma physics. He has produced codes for complicated realistic problems such as tsunamis generated by rockslides, and waves in the solar atmosphere. [/web/2019/13-191111-61](#)

(ETH Zurich, November 11, 2019)





Upcoming Science and Technology Related Events

International Conference on Advanced Computer Science and Information Technology (ICACSIT)

January 4, 2020

<https://10times.com/icacsit-bern>

IT & Technology

Bern

Applied Machine Learning Days (AML D)

January 25 -29, 2020

<https://appliedmldays.org>

Science, Research, AI, IT & Technology

Lausanne

World IA Day

February 22, 2020

<https://www.worldiaday.org>

Information Architecture Design

Zurich

Google Next Goes to Zurich

March 3, 2020

<https://is.gd/20rX4x>

Technology Transfer, Innovation

Zurich

Swiss Biotech Day

April 21, 2020

<http://swissbiotechday.ch>

Biotechnology, Pharmaceuticals, Life Sciences

Basel

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